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*The Cotton Industry
in Switzerland,
Vorarlberg, and Italy*

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The Cotton Industry
in Switzerland,
Vorarlberg, and Italy

A REPORT

To the Electors of the Gartside Scholarships

BY

S L BESSO, LL B,
Gartside Scholar

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THE GARTSIDE REPORTS

THE Gartside Reports are the reports made by the Gartside Scholars at the University of Manchester. The Gartside Scholarships were established in 1902 for a limited period, by John Henry Gartside, Esq., of Manchester. They are tenable for two years and about three are awarded each year. They are open to males of British nationality who at the date of the election shall be over the age of eighteen years and under the age of twenty-three years.

Every scholar must enter the University of Manchester for one Session for a course of study approved by the electors. The remainder of the time covered by the Scholarship must be devoted to the examination of subjects bearing upon Commerce or Industry in Germany or Switzerland, or in the United States of America, or partly in one of the above-mentioned countries and partly in others, but the electors may on special grounds allow part of this period of the tenure of the Scholarship to be spent in study and travel in some other country or countries. It is intended that each scholar shall select some industry, or part of an industry, or some business, for examination, and investigate this comparatively in the United Kingdom and abroad. The first year's work at the University of Manchester is designed to prepare the student for this investigation, and it partly takes the form of directed study, from publications and by direct investigation, of English conditions with regard to the industrial or commercial subjects upon which research will be made abroad in the second year of the scholarship. Finally, each scholar must present a report, which will as a rule be published.

The value of a Scholarship is about £80 a year for the time spent in England, £150 a year for time spent on the Continent of Europe, and about £250 a year for time spent in America.

PREFACE

THE following Report, based upon my personal investigations in Switzerland, Vorarlberg and Italy, gives a comprehensive account of the conditions that prevail in the cotton industry of those countries, comparing them where possible with the conditions prevailing in England. I have had in view both the practical man and the student of Economics. Technical, economic and social conditions act and react on one another to such a marked degree that an investigation which were to take account of only one of these aspects would be incomplete and would form no true basis for international comparisons. I have therefore attempted to describe on the one hand the standard of efficiency attained in the manufacturing processes and the present state of commercial development, and on the other hand the conditions of life of those employed in the industry.

As regards the technical side of my study, I should like to draw attention to the tabulated particulars of spinning mills and weaving factories, appended to Chapters II, III, XIII and XIV. I tabulated the details obtained from a number of the factories I was privileged to visit, and have selected from this number the forty that seem the most useful for the purpose of giving those engaged in the English cotton industry an idea of what is being done in the countries I visited. The factories selected are typical of the different conditions prevailing and of the various classes of work done.

So far as I am aware, no similar sets of tables are to be found in the literature of the cotton industry

Considerations of space have compelled me to omit a certain amount of detailed information regarding reeling, doubling and other subsidiary branches of the industry. It would have been interesting to devote more attention to the history of the industry in Italy and Switzerland, particularly the latter, and compare the forms that arose in the course of its development with those that have appeared in the Lancashire cotton industry. But this would greatly have increased the bulk of the Report.

I have supplemented my personal investigations in the countries dealt with, by various necessary details drawn from official and other publications, due reference to which will be found either in the text or in foot-notes. No book exists devoted either to the Swiss or to the Italian cotton industry as a whole, but some account of the early period of the latter is contained in Dr Leopoldo Sabbatini's "*Notizie sulle Condizioni Industriali della Provincia di Milano*" (1893), and references to the Swiss cotton industry are found in the writings of Dr H. Wartmann, Actuary of the Kaufmannisches Directorium of St. Gallen, and in those of the late Dr F. Schuler who, after having served with distinction as factory inspector in the Canton of Glarus, became the first Federal Factory Inspector, and may not inaptly be termed the Leonard Horner of Switzerland. A dissertation on the Zurich cotton industry prior to the introduction of the factory system has been written by Dr E. Kunzle, of Zurich, there is a book on the East Swiss embroidery industry by Dr A. Steinmann, Secretary of the Swiss Textile Employers' Association, and Dr. Jenny of Ennenda (Glarus) has written an important work on the calico printing industry of his native canton. More particular reference to some of these works will be found in the following pages. Further, there are

sections on Italy and Switzerland in Dr Oppel's well-known book, "Die Baumwolle," but unfortunately these sections fall far short of the standard of accuracy and reliability set in other portions of the work, and are essentially misleading. Much of the evidence relating to the collections in the cotton industry of these countries given before Mr Chamberlain's Tariff Commission, and published in its Report, is totally worthless and should have been refuted in the Free Trade League's Reply.

In conclusion I must express my gratitude to the following —

First Mr Walter Speakman, Secretary, and Mr E H Langdon, E\ President, of the Manchester Chamber of Commerce, for introductions to the chambers of commerce in the principal cotton centres visited, and Principal Reynolds, of the Manchester School of Technology, for introductions to technical experts on the Continent.

Secondly the gentlemen in the countries visited who in a multitude of ways rendered me services without which the prosecution of my research would have been impossible, including British Consular officials, members of the British commercial community, Government officials, officers of chambers of commerce and of employers' and workmen's organisations, and above all, those spinners, manufacturers, calico printers and others, who with fine courtesy and generosity showed me over their mills and factories and gave me detailed particulars of their working.

Finally those who have aided me in the preparation of this book, namely, Professor S J Chapman, Dean of the Faculty of Commerce in the University of Manchester, Mr W Myers, Lecturer on Weaving in the Manchester School of Technology, Mr J Winterbottom, Lecturer on Spinning in the Manchester School of Technology, and Mr Oscar M Wihl, Barrister-at-

Law, all of whom have read portions of the work and made many valuable suggestions, and Professor T W Fox, Head of the Textile Department of the Manchester School of Technology, and Mr S Horowitz, Barrister-at-Law, who have read through the proofs and favoured me with useful criticisms and advice. Had ~~it~~ not been for their kindly help, my work would have been more imperfect than it is.

S L BESSO

MANCHESTER,
April, 1910

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WEIGHTS AND MEASURES AND CURRENCY

The metric system of weights and measures is employed in Switzerland, Austria and Italy. As that system is generally understood in this country, such weights and measures have as a rule been left unchanged in the following pages.

The following table shows the relations between English weights and measures and the metric system.

1 centimetre (cm)	= 0.394 inches
100 cm = 1 metre (m)	= 39.37 inches
1 kilogramme (kilo)	= 2.205 lbs
100 kilos = 1 quintal (q)	= 220½ lbs (roughly 2 cwts)
1,000 kilos or 10 quintals	= 1 metric ton

As regards currency, Italy and Switzerland belong to the Latin Union, and their coins are of equal value with those of France. The Italian coin equivalent to the franc is the lira, but for the sake of uniformity the word franc (abbreviated fr) is used throughout this book. One franc approximately is equal to 9½ pence, 100 centimes (cts), Italian *centesimi*, = 1 franc.

PART I
SWITZERLAND

CHAPTER I

ORIGIN, MAGNITUDE AND LOCALISATION OF THE
INDUSTRY

THE cotton industry of Switzerland as a factory industry dates back to the beginning of the 19th century, the era of the English discoveries and inventions in textile machinery, and at a still earlier period there was a fairly considerable home industry. The first mechanical spinning mill was erected in 1801 in St. Gallen. In 1811 Heinrich Kunz, known as the "Spinning King" in Switzerland, laid the foundations of what is now the most important spinning concern in the country, erecting a small mill with 14,000 spindles at Uster in the Canton of Zurich. When Kunz died in 1859, he left eight mills with 150,000 spindles in all, and the firm now possesses 180,000 spindles. In 1825 the firm of J. J. Rieter & Co., of Winterthur, was established for the manufacture of spinning machinery, and soon attained such technical excellence that yarns as high as 300s were successfully spun on its mules in its own mill. In 1832 the first power looms were set up in a factory in Uster but were destroyed by a body of enraged handweavers. Five years later a factory was again equipped in Uster with power looms, this time with happier results. About the same time Kaspar Honegger founded his works for the manufacture of power looms, which has developed into one of the most renowned of the Continental engineering works of the present day.¹

¹ H. Wartmann's 'Industrie und Handel der Schweiz im 19. Jahrhundert,' and E. Künzle's 'Die Zürcherische Baumwoll-Industrie von ihren Anfängen bis zur Einführung des Fabrikbetriebes.'

According to the Report of the 'Swiss Spinners', Doublers' and Manufacturers' Association for 1907 there were at the end of that year 1,493,012 spinning spindles in the Association, and it is estimated that the total number in the country was 1,501,000 spindles. About 800,000 are engaged on Egyptian cotton. The number of doubling spindles is between 90,000 and 100,000, many of these are in spinning, weaving and embroidery factories, and the rest are distributed among a number of small doubling mills.

It is not possible to state exactly the number of looms, but it is approximately as follows —

Plain goods power looms	18,000
Coloured goods power looms	6,000
Hand looms	4,500

The number of firms engaged in the industry, apart from doubling and hand loom weaving firms and those performing only finishing operations, is 127, to be classified as follows —

- 68^a spinning, with average of 22,000 spindles
- 53^b grey cloth manufacturing, with average of 320 looms
- 30^c coloured goods manufacturing, with average of 200 looms

a 44 entirely spinning, 20 spinning and grey cloth manufacturing, 4 spinning and coloured goods manufacturing, several have doubling departments

b 33 entirely manufacturing, 20 spinning and manufacturing

c 26 entirely manufacturing, 4 spinning and manufacturing; a few have doubling departments

It is difficult to estimate the number of factories, as several spinners and grey cloth manufacturers own two or more factories, which are in the majority of cases at

no great distance from one another. Coloured goods manufacturers possess as a rule only one factory.

The average size of the independent spinning concerns is somewhat greater than that of the combined concerns, but with regard to manufacturing the opposite is the case. Most of the firms are private concerns, the limited liability company not being nearly so prominent as in England. There are more limited companies in the spinning than in the manufacturing branch of the industry, as in England, but even in the spinning industry the firms were always established by private owners, and were only subsequently transformed into limited liability companies. These are for the most part family concerns, whose shares are not on the market, and have been formed in many cases merely to provide a convenient means of apportioning the property.

As regards the number of workpeople employed, the following are the figures given in the *Statistique Suisse des Fabriques*, 1901 —¹

Spinning and Twisting	12,030
Weaving	16,133
	<hr/>
	28,163
Dyeing, Printing, Bleaching and Finishing	7,084
	<hr/>
	35,247
Embroidering	25,927
	<hr/>
	61,174
	<hr/>

Of the above, 12,151 were described as home workers, of whom 2,247 were engaged in weaving and 9,176 in embroidering.

Unfortunately these statistics are unreliable, notably

1. Quoted from 'Memoranda, Statistical Tables and Charts,' Second Series, 1904, published by the Board of Trade.

in regard to embroidering operatives¹ The figures relating to home weavers also are inaccurate, for the members of the Appenzell Weavers' Union, who are practically all cottage hand weavers, number about 2,300, and there are about 1,500 non-union hand weavers in Appenzell besides some hundreds in other cantons. Probably a fairly correct estimate of the total number of home weavers would be about 4,500, and there are also a number of old people and children employed at reeling and other subsidiary work.

The cotton industry is practically confined to the German cantons² Prior to the great age of mechanical inventions there was a flourishing hand industry in Geneva and other parts of French Switzerland, but this had vanished before the commencement of the factory era.

The following table shows approximately the present geographical distribution of the industry —

Canton	Firms	Spinning spindles.	Power Looms.	
			Grey cloth	Coloured goods.
Zurich	50	620,000	8100	700
St. Gallen	18	275,000	2100	1600
Glarus	16	255,000	4100	200
Aargau	18	100,000	550	2400
Appenzell		Hand weaving		

There are also spinning and weaving factories in the cantons of Thurgau, Berne, Schwyz, Zug, Solothurn, Lucerne and Tessin. As a rule the cotton factories are found on streams from which they derive their motive power, and being in valleys they have the advantage of a comparatively humid atmosphere. In some valleys there is a succession of factories in each of a series of villages, all obtaining their power from the same stream,

¹ See p. 58 below for an account of the numbers employed in the embroidering industry.

² A weaving factory has recently been erected in the Italian Canton of Ticino (Tessin).

A high degree of local specialism is not attained, but there are four districts with marked individual characteristics —

(a) Winterthur in Canton Zurich, and the neighbouring villages, where there is a marked concentration of the spinning industry

(b) Wald in Canton Zurich, which possesses nearly 4,000 looms, almost all engaged in the manufacture of muslin and fine cambric for embroidering

(c) The small Canton of Glarus, which is the principal seat of the spinning of medium yarns and the manufacture of bleaching and printing cloths. A notable feature of the Glarus industry is the extent to which spinning and manufacturing are combined in the same concern

(d) The Canton of Aargau, where there is some localisation of coloured goods manufacturing

CHAPTER II

SPINNING

SECTION I—*Classes of Work and General Conditions*

The average annual imports¹ of raw cotton in the six years 1902-7 were as follows —

American	135,310	Meterzentner ²
Egyptian	94,667	„
Indian	10,973	„
Other	1,013	„
<hr/>		
Total	241,963	„
<hr/>		

About 25,000 zentner² of cotton waste are imported each year, and there is a small export of raw cotton and cotton waste. The average annual import of raw cotton and cotton waste for the ten years 1897—1906 was 258,508 zentner, the average export 26,012, and the average yearly consumption 232,496 zentner. An increased consumption is thus shown for the later years.

Owing to extra cost of transport, raw cotton costs about $\frac{1}{4}$ d per lb more in Switzerland than in England.

The consumption of cotton in bales per 1000 spindles in 1907 was as follows in the countries named —³

	Switzerland	England	Germany	Italy
American	38 75	68 11	123 53	171 41
Egyptian	19 52	7 67	10 73	4 56
Other	4 31	4 46	46 46	79 01
<hr/>		<hr/>	<hr/>	<hr/>
Total	62 58	80 24	180 72	254 98

1 Particulars relating to Swiss imports and exports of cotton and cotton goods are in all cases derived from the Annual Returns of the Swiss Statistical Department (Amtliche Handelsstatistik).

2 One zentner = 1 quintal = 100 kilos. = 220 $\frac{1}{2}$ lbs., or roughly 2 cwt.

3 From Report of Swiss Spinners', etc., Association, 1908.

The following table shows the average annual imports and exports of yarn in quintals¹ for the years 1900-05 and 1906-7 —

Years	Imports	Exports
1900-5	5,150	29,594
1906-7	12,632	23,595

Rather more than half the exports and by far the greater part of the imports consist of yarns of counts over 40s. The importation of English yarns of 70s and upwards has increased,² and the gap between the quantity of imports and exports has rapidly narrowed, during recent years. This is largely due to the rapid growth of the fine muslin and embroidery industries, which has intensified the home demand for yarn of the higher counts. This demand has induced spinners wherever possible to turn from the spinning of low counts for export, to the more profitable production of high counts for the home trade, and the high protective tariffs of Germany and Austria, the chief foreign markets for Swiss yarn, have encouraged this policy. The demand in these two countries for the finer Swiss yarns is still good, but a better price and better terms can usually be obtained in Switzerland. The local industry cannot produce a sufficient quantity of fine yarns to supply the demand of the muslin manufacturing and embroidering industries, and hence recourse must be had to English yarns, which are very largely used for muslin manufacturing, though Swiss yarns, spun from Egyptian cotton, are almost exclusively employed for embroidering.³ In response to urgent representations on the part of the spinners, the duties on fine cotton yarns in the revised tariff of 1906 were consider-

¹ = 100 kilogrammes = 220½ lbs. or roughly 2 cwts.

² There was a falling off in 1908 owing to the general trade depression.

³ Much doubled yarn is used in the embroidering industry, most of which is doubled in St. Gallen, Appenzell and Zurich.

ably increased, but so far there does not appear to have been a material restriction in the import of English yarns as a result of the tariff. The bulk of the fine yarns spun in Switzerland are from 70s to 90s, though a fair quantity of weft up to 120s is spun. 1 wist above 90s and weft above 120s must, as a rule, be imported from England, as they cannot be advantageously produced in Switzerland, but the highest counts are not in such great demand as those within the capacity of Swiss spinners.

Towards the end of the last and at the beginning of the present century the Swiss cotton industry received severe blows from the growth of competing industries, fostered by high protective tariffs, in the neighbouring countries. Swiss spinners have suffered from this competition in two ways, first, directly by the diminution in yarn exports, and secondly, indirectly through the reduced export of cotton cloths woven from Swiss yarns, particularly coloured cloths. But this does not seem very much to have affected the Glarus spinners, who produce mostly for the use of their own grey cloth weaving factories. In many cases where more yarn was produced than could be consumed by the weaving factory, some quantity was exported. This export trade having been checked, additional looms have been set up to consume the surplus production of yarn. As a result of the lessened foreign demand for Swiss yarn there was a gradual decrease in the number of spindles. This was effected in two ways, partly by the failure to rebuild mills that were accidentally burnt down, and still more by the transformation of old cotton mills into factories of other kinds. Among existing mills are many with antiquated machinery which the owners will not renew, as they consider the outlay of capital unwarrantable. These mills will probably sooner or later cease to work, and one can only wonder how some of them continue to exist at all in competition with more modern mills. The

explanation probably is that their whole value has already been written off, and they need only show a return on working expenses. The increased demand for the higher counts of yarn has not proved sufficient to counteract this movement, as the mills that have gone out of work were not adapted for fine spinning, being old and too small for long mules, and though those mills that can do fine work are successful, there is not sufficient inducement to build new ones in the face of English competition.

Some figures taken from the Factory Inspector's Report for the First District, which includes the majority of the spindles of the country, will illustrate the movement that has taken place

Year	Mills.	Spindles.	Operatives.	Operatives ¹ per 1000 spindles
1888	86	1,355,000	9205	6 79
1905	70	1,227,487	7682	6 25

In the seventeen years from 1888 to 1905 there was a decrease of 127,500 in the number of spindles in the district. Against this must be set the fact that the plant in several of the largest and some of the smaller mills was renewed, so that the productive power of the industry did not necessarily diminish and may even have increased. The decrease in the number of mills was greater than that in the number of spindles, so that the average number of spindles per mill rose from 15,756 in 1888 to 17,536 in 1905. This shows that it was the small mills that dropped out of the race, while the larger and more efficient mills survived. The average number of spindles per firm engaged in the spinning industry is about 22,000,² and in comparison with this the average of 17,536 spindles per mill will give some indication of the relation between the number of firms

¹ For discussion of the efficiency of the operatives and of the proportion of workpeople to machinery see pp. 68-69.

² See p. 4. The average for England is between 50,000 and 60,000.

and the number of mills, but the indication is only a very rough one, as the two sets of figures do not relate to the same area, and since 1905 the average number of spindles per mill has increased

The "typical" mill contains about 30,000 spindles, but the varieties of size existing are very great, the smallest mill contains only 6,000 spindles, while the largest has 100,000, and between these extremes there are many mills with less than 20,000 and a few with over 40,000 spindles

SECTION II — *Power, Equipment and Working*¹

A majority of the mills are driven wholly or partially by water power. In recent years the Francis Turbine, which utilises water power better than any other system of direct water drive, has been installed in many mills, especially those where mules have been replaced by ring frames, as in them more power is required. Steam and electrical driving are also frequently employed. The former is generally found cheaper in the case of large mills, but in small mills electric driving proves more economical. Much depends on whether the mill possesses a good supply of water for generating its own electric power, or whether it has to obtain it from a central supply station. If the amount of power required is constant, the first named method is most advantageous, but a direct water drive is generally preferred owing to its cheapness. Sometimes the water rights belong to the mill outright, in other cases a small tax must be paid to the Canton or Commune, but this expense is almost negligible.

The most prevalent case of the use of electric power is where it is employed as an auxiliary to direct water driving. Many mills possessing water power which is sufficient for their purpose during spring and autumn, but not in summer and winter, have a steam engine for

¹ Of Appendix to this chapter

use in the dry seasons, and this of course detracts very much from the advantage conferred by the possession of water power, since though the consumption of coal only continues during a few months in each year, capital is locked up in the steam engine, which cannot be used to its fullest extent, as it must remain idle during two of the four seasons. In such cases it has been frequently found advantageous to do away with the steam engine and obtain electric power from a central station at a fixed price per unit, to be used as occasion demands. Similarly, where mills which were originally driven entirely by water, were extended, steam engines were formerly installed to supply the additional power required. But now that the conducting of electric power to considerable distances is so much easier than formerly, many firms have set up electrical generating works by water power which may be at some considerable distance from their mills. Direct electrical driving of sections of spinning machinery is not found in Swiss mills, the usual method being the rope drive, while shafting and toothed gearing are only now seen in old-fashioned mills.

Where water power sufficient to drive the mill throughout the year can be obtained, there is no doubt that it is cheaper than steam driving in England, but where electrical power is used, though it may under certain conditions be cheaper than electric power in England or steam power in Switzerland, it is not cheaper than steam power in England. Owing to the high state of development attained by the Swiss engineering industry, steam engines, as well as all kinds of electrical machinery, can be produced as cheaply and at least as well as in England. Indeed much Swiss machinery, including the steam engine, is imported into this country. Nevertheless the cost of steam driving is much higher in Switzerland than in England, for as there are no local coal mines, all coal

has to be brought from Germany or England, and the heavy freight it has to bear, often amounting to as much as the price of the coal at the pit mouth, makes it very expensive¹

The majority of mills are three or four storey buildings they are generally painted white and are situated as a rule in pleasant country districts, often with bushes growing right up to their walls. The diversity in style and equipment is very great, for while some mills have narrow rooms and low ceilings and machinery as much

¹ Coal from Saarbrück (Westphalia) cost in 1906 including all charges fr 30 to fr 35 per ton. Ruhr coal cost fr 30 to fr 44 per ton. The coal used in cotton factories usually costs from fr 35 to fr 40 per ton including smashing. The cost of coal for Lancashire factories is only about 10s per ton. Swiss manufacturers are more careful than English to economise in coal consumption.

It is very difficult to obtain reliable information about the cost of driving. In Switzerland the cost of electric power obtained from central distributing stations varies considerably according to the locality and of course to the amount of power required. Large mills can in some cases obtain power by special agreement at fr 90 per h.p. per year of 3,200 hours, or 0.27d per hour but small factories must pay fr 150-200 per h.p. per year for amounts of 20 to 30 h.p. The cost to a firm of an hydro electrical installation of 60 h.p. is about fr 1,000 per h.p. These charges are rather less than those usually made for electric power in England viz 3d to 1d per kilowatt-hour or £7 to £9.3 per h.p. per year of 2,800 hours. However it is impossible to ascertain the prices charged to textile factories in England for electric power in large amounts.

The cost of steam and electric driving in England is discussed in two very interesting articles by Mr G. B. Storie in the Textile Manufacturer of February and March 1910. He shows that the introduction of the steam turbine has greatly reduced the cost of electric driving in this country. Taking as the basis of his estimate a plant of 1,600 h.p., he gives the cost of a mechanical drive (rope drive) as £2 9s 4d, and that of an electric drive (turbo alternator) as £2 9s. 10d per h.p. per year of 2,800 hours.

Calculations I have made based on information relating to certain mechanically driven weaving sheds in Lancashire supplied to me by Mr W. Myers of the Manchester School of Technology, give the following results —

For a plant of 300 h.p. the cost is £3 7s 4d per h.p. per year of 2,800 hours or 0.29d per hour, for one of 1,000 h.p. the cost is £2 8s. 3d per h.p. per year, or 0.21d per hour. For two other plants, one of 332 h.p. and one of 320 h.p. the cost is £2 17s 6d and £2 3s 8d respectively per h.p. per year exclusive in both cases of interest and depreciation. Possibly the full amount under these headings had already been written off.

In his book on "Cotton Spinning Calculations" Mr J. Winterbottom gives the cost of driving as 0.34d. per h.p. per hour, absolutely inclusive

as forty years old, there are others which, though the fabrics are old, are yet spacious and lofty, and equipped with the most modern and up-to-date machinery. But many even of the larger mills have very old machinery, as it is the custom to repair it time after time, and to replace worn-out parts, whenever possible, instead of buying new machinery. Most mills, including even those situated near engineering works, have small machine shops, to do their own repairs and renewals.

The reason that even large and successful mills renew their machinery so seldom is that it is very expensive. Much textile machinery comes from England, and freight and duty must be paid on it in addition to the first cost. The duty is at the rate of fr. 4 per 100 kilogrammes, and it is reckoned that the total price of the machinery delivered in Switzerland is 20 per cent higher than the price of the same machinery in England. There is only one firm of makers of cotton spinning machinery in Switzerland, and though this firm can turn out first rate work, it is comparatively small and is unable to supply the whole Swiss industry, though it does a fair export trade with Italy and other countries.¹

The differences in style and design between machinery of Swiss and English make are no greater than those between the work of different English firms, though English machinery is usually heavier and more durable, while Swiss machinery is generally superior in finish. Since the equipment of an average Swiss mill is comparatively old, the mules are generally much shorter than those common in English mills, mules with 500 to 700 spindles being not uncommon, and even new mules must often be short, because the mills, having been

¹ English makers usually quote *c i f* terms, and sometimes inclusive of mounting the machinery in the mill. Recently a large mill was renewing its plant and got tenders from the Swiss and an English firm. The latter would not quote inclusive of mounting, but only for the machinery delivered in cases to the spinnery, whilst in this instance the Swiss firm quoted the same price inclusive of mounting and was accordingly successful in obtaining the order.

designed for short mules, cannot accommodate long ones

Formerly all Swiss spinning was done on mules, but in recent years the ring frame has been gaining ground, and in 1908 the number of ring spindles in work was 211,000. This movement was encouraged by the boom in the European cotton industry of 1905-7, which, though it did not cause any extension in the spinning industry comparable to that in England and Italy, yet impelled many Swiss spinners who found themselves unable to cope with the orders flowing in, to undertake extensive renewals of plant. As ring frames take up much less room than mules, and are at the same time more productive, by their means the number of spindles and in a still greater degree the production of yarn could be increased, without any increase of accommodation, and the ring frame can be tended by girls, which is a particularly important consideration, owing to the fact that difficulty is experienced in obtaining an adequate number of men for the spinning industry.¹ But as mules are better adapted for the classes of work usually done in Switzerland, they cannot be generally replaced by ring frames, at least for the present.

In the preparation departments of the larger Swiss mills there is nothing strikingly different from English mills. Devices are occasionally found for removing fluff and dust from the carding engines before it escapes into the room. These take the form of air suction tubes fixed over the cards. During ordinary work the suction force is slight, but when a card is to be cleaned or ground it can be increased. Most cards are of the revolving flat type, but roller and clearer cards and fixed flat cards are still found in old-fashioned mills. In many small mills where there is not sufficient work to keep a bale breaker continuously employed, the cotton is fed from the bale into the opener by hand.

¹ Cf. p. 66.

As a rule machinery is run slower in Switzerland than in England, and a lower production is obtained. This is often due to the fact that the machinery is old and unable to attain the speed and production of which new machinery in an English mill is capable. The normal speed of mule spindles in Switzerland is 7500—9000 revolutions per minute, and of ring spindles 8000 to 9000 revolutions. Even when the machinery is modern the English standard of speed and productivity is rarely reached, owing to the miscellaneous character of Swiss work. Whilst some mills confine themselves to a range of the lower counts and others to medium or high counts, there are mills spinning counts ranging from 4s to 100s, and very few mills indeed confine themselves to one or two counts, even small mills undertaking what would be in England an exceptionally wide range. The reason for this is that the industry is too small to allow of thorough specialisation, which would only be possible if the whole industry could devote itself to some one branch, say, fine spinning, and distribute its product throughout the world. But Swiss yarns cannot dominate the world's markets because they cannot compete in oversea countries with English yarns. Hence the Swiss spinners must set themselves to supply the demand of home manufacturers and of the neighbouring countries, and this demand being for a variety of yarns, Swiss spinners are obliged to undertake a variety of work to satisfy their customers. This has had a bad effect on their productive efficiency, for the machinery must be arranged to suit the work in hand and has to be altered frequently, as different work is allotted to it. This impairs the efficiency of the machinery, and also of the operatives, who are unable to acquire the dexterity of people who are continually employed on the same kind of work. In fine, Swiss spinners cannot make the most efficient use of machinery or labour, as the changes interfere with systematic organisation, e.g.,

in the case of each class of yarn produced, sufficient machinery, power and labour for the greatest demand must be kept available, which are not fully utilised under other conditions. The attempt has been made to run spinning machinery at the speed usual in England, but it has generally been found inadvisable to do so, as the quality of the yarn was impaired. Some Swiss spinners, indeed, claim that by running their machinery more slowly they are enabled to produce more perfect work than their English competitors. This may sometimes be the case with yarn of medium or slightly over medium fineness, but it is certainly not the case with fine counts. Swiss fine yarns are doubtless superior to those of Germany and other European countries, but distinctly inferior to those of England.

In order to spin more successfully the finer and even the lower counts of yarn, much use is made of humidifiers. The principle of these is often to pump air through a cistern of water, and to convey the damp air thence by pipes and emit it into the room. Another method frequently adopted is that of emitting fine sprays of water into the spinning room. In many mills warm air or warm sprays of water are injected in winter and cold in summer. It is not generally necessary to utilise the humidifiers throughout the whole year, the extent to which they must be used depending partly on the counts of yarn spun and partly on the situation of the mill. Thus a mill spinning low counts and situated in a valley subject to mist, may only need the aid of its humidifiers for about two months out of the twelve, whereas others require them almost all the year round.

The most general method of lighting is by electricity, which is always employed in mills which are electrically driven. In other mills gas, especially incandescent gas, lighting is fairly common, while a few old-fashioned mills are illuminated only by oil lamps. Steam pipes provide the most general means of heating. There are

not many mills equipped with sprinkler installations as a precaution against fire, though certain of the larger mills have them. The smaller mills that have not got sprinklers are all equipped with some system of fire extinguishers, the best and most frequently found being hydrants. As the fire insurance companies are very strict, it is essential in all cases that an efficient system of fire extinguishers suitable to the circumstances should be provided.

The total cost of building and equipping a Swiss mill is fr 75-100 per spindle (i.e., from £3 to £4 per spindle) according to the character of the mill and its situation, but most existing mills were erected when conditions were far other than they now are.¹

¹ In the Free Trade League's Reply to the Report of the Tariff Commission on the Cotton Industry it is estimated that the cost of constructing and filling a cotton mill of 80 000 spindles in Oldham is about 25s per spindle.

APPENDIX

TABULATED PARTICULARS OF TEN SPINNING MILLS

MILL	No 1	No 2
POWER	Francis turbine and electric from their own power station	Francis turbine Steam engine in reserve
OPENING	1 bale breaker 1 hopper fed Crighton opener	1 opener
SCUTCHING	1 opener for waste 1 inter and 1 finish for American 1 scutcher for Egyptian	1 scutcher
CARDING	1 waste scutcher 34 revolving flats production 5-6 k per hour	16 revolving flats
COMBING	—	Mulhouse single head combers
DRAWING FRAMES	27 finish deliveries	3 frames
SLUBBING FRAMES	Being renewed	3 of 76 spindles
Spindle revs per min	—	550 revs
INTERMEDIATE FRAMES	Being renewed	3 of 136 spindles
Spindle revs per min	—	720 revs
ROVING FRAMES	Being renewed	6 of 180 spindles
Spindle revs per min	—	1 100 revs
JACK FRAMES	Being renewed	14 of 212 spindles
Spindle revs per min	—	1 250 revs
RING FRAMES	—	—
Spindle revs per min and production per hour	—	—
MULES	18 of 640 spindles $1\frac{1}{2}$ gauge for American twist 18 of 750 spindles $1\frac{1}{2}$ gauge for American weft 16 of 672 spindles $1\frac{1}{2}$ gauge for Egyptian yarn	12 of 1,128 spindles, twist and weft 4 of 636 spindles weft
Spindle revs per min and production per hour	9 500 American 8 500 Egyptian	Modern 9,500/10 000, old 7,500
TOTAL SPINNING SPINDLES	35 772	16 056
OPERATIVES	180	75
OVERLOOKERS (spinning and preparation)	5	2
HOURS OF WORK	11	11
COTTON USED	Egyptian and 30 num American	Egyptian
COUNTS SPUN	30"-60" twist 30"-90" weft 50"-80" embroidering	70"-120"
GENERAL PRODUCTION OF YARN	8,000 k American } per 2,000 k Egyptian } week	2,400 k per week
DESTINATION	Home market, Austria and Germany	Home market Germany and Austria

No 3	No 4	No 5
Water turbine Steam engine in reserve	Water turbine 60 h p Electric from their own power station 120 h p	Water turbine
Double opener	1 Crighton exhaust opener	1 bale breaker 1 hopper fed Crighton opener
3 scutchers (through twice)	1 double scutcher	1 inter and 1 fin h
44 revolving flats 6 roller and clearer	15 revolving flats 10 opening fixed flats 12 finishing fixed flats 1 lap machine	20 revolving flats production 591 k per hour 16 fixed flats production 37 k per hour
2 of 3 heads and 4 deliveries 1 of 4 heads and 3 deliveries 2 of 4 heads and 4 deliveries 1 of 3 heads and 6 deliveries 5=106 spindles	2 of 3 heads and 6 deliveries 1 of 3 heads and 3 deliveries (Indian)	20 finish deliveries
7=816 spindles	2 of 72 spindles 1 of 56 spindles (Indian) 2 of 112 spindles 1 of 80 spindles (Indian)	4=282 spindles 8=688 spindles
24=3 560 spindles	3 of 140 spindles (Egyptian and American) 2 of 144 spindles (American) 2 of 112 spindles (Indian)	14=2 088 spindles
2=932 spindles	8=1,264 spindles (all on twist 10 ^u —30 ^u) 8 200—9 000 revs	23=6 700 spindles 9 000 revs 0 66 hanks 38 twist 28 of 580—620 spindles each
7 500 (on 40 ^u twist)	2 of 900 spindles 4 of 800 spindles (all on twist 35 ^u —30 ^u)	
8 of 1,056 spindles 18 of 630 spindles 8 of 460 spindles		
8,000 (on 36 ^u)	2 000—6 000 8½—5½ draws of 72" per min	8 000 revs 0 41 hanks 38 ^u
24 430 123	7 664 58	23 700 190
3	1 with assistant directly responsible to owner	3
11	11	11
Mostly American, a little Egyptian 10 ^u —60 ^u can run 24—50 ^u	Indian American and Egyptian 35 ^u —30 ^u	American 28 and 29 nun 30 ^u —44
8 000 k 40 ^u per week Own weaving shed and home market	6 400—7 000 k. per week 75 % own weaving shed 25 % sold	8 000 k per week Own weaving shed

MILL	No 6	No 7
POWER	Water turbine	Water turbines 500 h p for driving 100 h p for electric lighting
OPENING	1 opener	1 bale breaker 1 opener
SCUTCHING	1 scutcher	3 inter and 6 finish
CARDING	22 revolving flats production 5.5 k per hour 3 fixed flats production 4.1 k per hour	13 revolving flats production 5.7 k per hour 34 opening fixed flats 34 finishing fixed flats 1 lap machine 1 spool machine 10 Hübner combers
COMBING	—	4 of 3 heads and 5 deliveries, 6 ends up 2 of 3 heads and 6 deliveries, 8 ends up
DRAWING FRAMES	9 frames	3 of 62 spindles 2 of 72 spindles —
SLUBBING FRAMES	3=160 spindles Spindle production per hour 0.75 hanks 0.65 ^a 0.98 hanks 0.45	6 of 124 spindles —
INTERMEDIATE FRAMES	4=270 spindles Spindle production per hour 0.81 hanks 1.65 ^a 1 hank 1.1	—
ROVING FRAMES	9 frames Spindle production per hour 0.61 hanks 4.5 0.86 hanks 2.7	9 of 140 spindles, 7 of 144 spindles
JACK FRAMES	—	8 of 188 spindles For Egyptian cotton
RING FRAMES	6 of 372 spindles	9=3 800 spindles
Spindle revs per min	8 200	8 500—9 500
Spindle production per hour	—	—
MULES	14 of 752—872 spindles	52 of 756—812 spindles
Spindle revs per min	9 000	7 000—7,500 (4½ draws of 175 cm per min. 40 ^a revs not given)
Spindle production per hour	0.48 hanks 44 ^a	—
TOTAL SPINNING SPINDLES	13 672	44 200
DOUBLING SPINDLES	—	—
OPERATIVES	70	225
OVERLOOKERS (spinning and preparation)	1 spinning and 1 preparation each responsible to owner	5
HOURS OF WORK	11	11
COTTON USED	American	American Egyptian
COUNTS SPUN	8 ^a —50 ^a	40 ^a —60 ^a 70 ^a —120
GENERAL PRODUCTION OF YARN	7 800 k 20 ^a per week	5 800 k. per week 42 ^a 2,100 k per week 118 5 ^a
DESTINATION	Home market	Mostly own weaving shed, a little export to Germany.

No 8	No 9	No 10
Francis turbine 1 000 h p (including weaving shed) 1 bale breaker 1 hopper fed Crighton exhaust opener 2 inter and 2 finish 80 revolving flats	Water turbine 20 h p 1 opener 2 scutchers 24 revolving flats	Water turbine 1 200 h p 1 bale breaker 4 openers 4 scutchers 100 revolving flats
—	—	20 lap machines 101 combers 360 deliveries
5 of 3 heads and 6 deliveries	4 frames	—
For ring frames only 1 of 80 spindles 0 92 hanks 0 8	4 of 90 spindles	13 of 60 spindles
2 of 112 spindles 0 91—1 0 hanks 1 8*	8 of 120 spindles	26 of 88 spindles
10 of 144 spindles 0 64—0 82 hanks 7 5*	8 of 120 and 4 of 60 spindles —	52 of 104 spindles —
—	—	78 of 160 spindles
34 of 250 spindles	8 200 spindles (Frames 200—500 spindles) 8 000	4 736 spindles (Frames 300—360 spindles) 0 000—8 000
0 6 hanks 34 twist	0 55 hanks 30*	—
52 of 660 spindles* 4 of 1 000 spindles*	8 of 660 spindles	36 of 800 spindles 4 of 560 spindles, 28 of 744 spindles, 7 of 440 spindles (for waste)
a. Draw 72 ins. in 20 secs. b. Draw 66 ins. in 14 secs.	7 500	{ 10*—36* 7 000—7 500 revs 40*—60* 10 000 revs. 60*—100* 8 000 revs.
0 41—0 46 hanks 34*—35	0 37—0 46 hanks 30*	—
46,300 2,500	13 480 3 000	59 688 —
210	110—140, according as they do little or much reeling	600 (including 4 men bleaching raw cotton) All mule minders are women
5	1 spinning and doubling 1 preparation each responsi- ble to managing partner	1 with 6 assistants spinning and 1 with 6 assistants preparation, both responsible to manager
11	11	11
Egyptian and American 28—30 mm 12*—30* on mules 30*—60* on rings 15 000 k. 90 hr week	American 10*—36* 6 000—7,000 k per week	American & Egyptian 300—350 k. raw cotton bleached per day 10*—100* also 4—8* from waste
22 % own weaving shed 67 % sold	Home market	Home market Germany and Austria 25 % delivered in bun- dles and 75 % in cops and tubes

CHAPTER III

WEAVING

SECTION I—*Classes of Work and General Conditions*A—*Grey Goods Factories*

THE imports of grey cloth considerably exceed the exports, and within the last few years they have risen rapidly. The explanation of the great importation of grey cloth lies in the fact that it supplies the raw material for important industries, principally those of embroidering, dyeing and printing, and after undergoing the different finishing processes the bulk of it is re-exported. The following table shows the average annual imports and exports of cotton fabrics¹—

Article	Imports		Exports	
	Quintals.	Francs	Quintals	Francs
Grey cloth ²	31 220	18 881 773	12 475	5 519 902
Dyed and bleached piece goods ³	5 746	3 581 007	13 739	13 062,382
Printed goods ³	3 787	3 082 245	11 019	7 152,261
Coloured woven fabrics ³	3 307	1 755 430	9 857	5 118 507
Flat-stitch woven fabrics	negligible	negligible	3 158	6 666 112
Embroidered cotton goods ²	negligible	negligible	55 065	123 141 617

There has been a notable development of the embroidering industry in the last few years which has stimulated the demand for muslins and cambrics as material for the embroidery, and this demand has been met in the case of cambrics chiefly by increased

¹ The table should be referred to also in connection with the following sections of this Chapter and with Chapter IV

2. Average for years 1899 1907 3. Average for years 1904 1907

imports from England,¹ and in the case of muslins for the most part by an increased home production. Since 1902 several new sheds have been built and many already existing factories have been enlarged in order to supply the growing demand for muslins, whilst several coloured goods manufacturers (mostly in Canton St. Gallen) have replaced their old plant either in whole or in part by new machinery for the manufacture of muslins. Many factories which were designed and equipped for the manufacture of light "printers" and bleaching cloths, are employed alternately on these and on cambrics or muslins according to the fluctuations in demand. Other grey cloth factories are permanently employed on a great variety of articles from coarse heavy cloths to muslins. In Canton Glarus and in Wald the range is not as a rule very wide, but elsewhere a similar condition of things reigns to that which exists in the spinning industry, for example, a factory of 350 looms produces 123 different cloths varying considerably in width, reed and pick, and yarns, and similar instances are common. The diversity of articles produced more seriously affects the employer than the operative, for it involves much thought and trouble to fit different orders in, and introduces a grave element of risk in forward purchases of yarn.

The reason given by embroidery manufacturers for their preference for Swiss muslins is that they are superior to English muslins in three ways: they are more evenly woven, freer from faults and also, owing to the way they are sized, better suited for the process of embroidering. English muslins are not sufficiently stiff, as the warps are tape sized, and this method does not answer so well for goods that are to be embroidered as does the method in vogue in Switzerland, namely,

¹ The duty on cloth imported to be finished and re-exported is remitted. Cf pp 51, 54—55

Scotch dresser sizing,¹ whereby the warp is well stiffened and strengthened for weaving without receiving too great a weight of size. The weft is generally steamed, so that when the cloth is woven, the size is to some extent absorbed by the damp weft, with the result that a cloth of regular stiffness is obtained. English makes cannot so well be used for bleaching, as the faults and unevennesses would show up too clearly, and so they are only as a rule imported for dyeing, when the faults are to a great extent hidden, but it is admitted that the quality of English muslins has greatly improved of late years. This comparatively faulty weaving is due to two causes, first that English muslin looms are run much quicker than Swiss, and second that an English weaver tends more looms than does a Swiss weaver, and in the case of fine articles like muslin this combination of quicker running and less careful attention has as its result inferior work. On the other hand, in the case of cambric which, being coarser, requires less delicate working, English makers can run their looms fast and give many looms to a weaver, and yet produce a first-class article well able to compete with Swiss cambrics, which, when the muslin trade is active, are only made by a limited number of manufacturers.

Some English printing cloth is imported by Swiss calico printers, but the local cloth is preferred, as there is little difference in price, and there are the advantages incidental to buying on the spot. Moreover, as regards light goods, Swiss are more reliable than

1 In this process the yarn passes slowly through cold or lukewarm size, and before it reaches the drying cylinders over which it passes it is well brushed by brushes which are continually kept moving to and fro at a suitable height above the yarn which passes slowly from the size box to the cylinder. This is a skeleton cylinder having wooden legs at some distance from one another. Within it there are steam pipes and a fan to dry the warps. The loom beam is in the middle and the warpers' beams are arranged at either end say four at each end, and the size box, brushes, and drying cylinder are duplicated there being, as it were two machines, one on each side of the loom beam on to which the warp from both sides is wound.

Burnley makes, for they are purer and less heavily sized, in addition to which, Swiss manufacturers deliver goods of the actual width, reed and pick, and yarns quoted, their specifications not being merely "nominal" like those of Burnley, though cloth may be bought to actual particulars in Lancashire, if this is stipulated for. As regards heavy cloths, however, Cheshire makes are fully as reliable as Swiss, and at least equal in quality, while they are cheaper as they leave the loom, though not necessarily so in Switzerland after freight and duty have been paid.

It is difficult to allocate expenses, with the exception of wages, equitably among the different articles produced in a Swiss factory. Roughly other expenses are equal to one and a half times the weavers' wages, while in England they are 85 per cent to 100 per cent of the weavers' wages. But it is impossible to make a precise comparison between the cost of production in the two countries.

Prior to the beginning of the present century there was a decline in the manufacturing industry, as the following figures¹ indicate —

Year	Factories	Looms.	No of Workpeople	Workpeople ² per 100 looms
1888	59	13,700	7,163	52.2
1905	55	13,480	6,747	50.0

In spite of the increase in the number of looms since 1902 there was a decrease of 220 looms between 1888 and 1905, but many old narrow looms were replaced by wide ones, and the majority of the sheds built since 1905 are equipped with wide looms, to weave muslins of 120 cm and 140 cm in width, which are in considerable demand for embroidering. The same tendency towards larger

¹ Taken from a recent report of the Factory Inspector for the First District which contains principally grey cloth factories. Aargau the chief seat of the coloured goods industry not being comprised in it.

² See p 70

concerns is observable as in spinning, the average number of looms per factory having increased between 1888 and 1905 from 232 to 245

The average number of looms per grey cloth manufacturing firm in all Switzerland in 1907 was 320, but as there was an increase both in the number of factories and in the average number of looms per factory between 1905 and 1907, these averages are hardly comparable. The "typical" grey cloth factory of to-day is a shed of about 400 looms.

B—*Coloured Goods Factories*

The export of coloured woven fabrics was formerly one of the most important branches of Swiss commerce, but it has been steadily dwindling during several years past, which is especially ominous owing to the fact that during a long period the great bulk of Swiss coloured goods was made for export. An important cause of this decline has been the erection of tariff barriers against Swiss goods by France, Italy and other countries in the interest of their own textile industries, by which Switzerland has lost many European markets, and not only so, but she has seen Italy arise as a keen competitor in the Levant and the Balkans. A similar blow to her industry was struck by the annexation of the Philippines by the United States. Formerly Manila was one of the principal markets for Swiss fancies, but since the annexation the Americans have imposed their tariff system on the islands and made every effort to exclude European wares and secure the trade for themselves. In this attempt, in spite of some fluctuations, they have had a fair measure of success, with the result that Swiss exports to that market have seriously diminished. Another cause is the intensification of British and Dutch competition in India. This great country formerly consumed considerable quantities of Swiss coloured goods, but in

recent years they have been to a great extent driven from the market by English goods in British India and by Dutch goods in the Straits Settlements and the Dutch East Indies. This is said to be due entirely to the cheapness of English and Dutch coloured goods, which are offered at prices with which Switzerland cannot compete, handicapped as she is for over-sea traffic by her inland situation, which entails heavy railway freight in conveying goods to the nearest port. The loss of these Eastern markets has not been made good by the gain of other foreign markets, and the efforts in the direction of cheaper production made by Swiss manufacturers, which have largely taken the form of substituting American for Egyptian yarns in medium qualities, have proved insufficient to arrest the movement, in spite of the fact that in many specialities Switzerland still maintains her position owing to the perfection of make and the excellence in colours which her cloths possess. In consequence of the loss of the export trade a few of the smaller coloured goods factories have ceased to work, while several important concerns have gone over to the now more profitable branch of muslin manufacturing, and a few firms in embroidering districts have replaced their coloured goods looms either in whole or in part by Schiffli embroidering machines. Many others, finding themselves unable to maintain the volume of their exports to their old markets, have turned their attention to the home trade, in which they are now protected against foreign competition by the raised tariff, and where they do not suffer from the transport disadvantages that handicap their over-sea trade. Many firms which formerly worked only for export now sell three-quarters of their production in the home market, to which several of the smaller concerns devote themselves entirely. Fortunately the growing general prosperity of the country has greatly increased its consuming capacity.

SECTION II — *Equipment and Working*¹

Most of the old weaving factories which still exist are three-storey buildings and are usually arranged with the looms on the ground and first floors, and with the preparation machinery on the top floor, which also sometimes contains the warehouse. But most of the newer factories are built in the shed style, with saw-tooth roof, like English weaving sheds. Several old manufacturing concerns possess an original three-storey building, from which a shed has been built out to accommodate new machinery as the business extended, in such cases it is perhaps more usual to build a separate new shed.

The nature of the power used for driving is the same in the manufacturing as in the spinning industry. But while individual and sectional electrical driving are not found in spinning mills, in at least one modern weaving shed each frame and loom is driven by a separate electric motor. In some small factories gas and benzine motors are used, especially as an auxiliary to water power, and prove more economical than steam or electrical driving where the amount of power required is not great.

There is less difference between Switzerland and England in the equipment of weaving sheds than in that of spinning mills, for while there are in the former country many small and old-fashioned concerns, the same is true of England also, and modern Swiss weaving sheds are as perfect and up-to-date in equipment as English, though they are generally much smaller. Nevertheless Swiss manufacturers, like Swiss spinners, as a class seem very chary of renewing their machinery, looms of 30 or 40 years of age being commonly found in the older factories. All minor repairs are done in the repairing shops attached to the factories. Sometimes when the resources of the shop are not equal to replacing a particular part, a wooden pattern is made and sent

¹ Cf. Appendix to this chapter

to a foundry to be copied in metal. The metal piece is then sent back to the factory, whose own mechanics finish it and fix it on the machine. The high cost of textile machinery is largely responsible for the great age to which machinery is allowed to attain. But in Swiss factories the machinery is run much slower than in this country, and suffers less wear, and as the main improvements in textile machinery are usually in the direction of increased speed, there is not so much inducement to possess them in a factory where speed of running is not so much desired as perfection of product, and old looms, when the harness and working parts have been renewed and only the frame is old, can do as good work as new ones. In factories which have been enlarged from time to time, one often finds looms bearing widely different dates, new machinery being introduced as required and old machinery remaining. The new looms, alike in England and Switzerland, are generally put on work that admits of quick running, the old looms being kept on work that requires a lower speed.

Much English weaving machinery is used in Switzerland, though not so much as spinning machinery. Indeed many firms that combine spinning and manufacturing have English spinning but Swiss weaving machinery. Switzerland possesses a very famous works for the manufacture of weaving machinery at Ruti in Canton Zurich, and there are also some smaller works, including one that specialises in muslin looms, and at Horgen on the Lake of Zurich there is a well-known firm of dobby manufacturers. Looms from Ruti and dobbies from Horgen are seen far beyond the borders of Switzerland. Many English plain and dobby looms with one shuttle box are used, while Swiss looms of every style are employed. The Swiss type of drop-box motion is most general, but English drop-box, and occasionally English circular box motions are also met with. Owing to the great scale on which the textile

engineering industry is carried on in Lancashire it is often possible to under-quote the Swiss makers and to offer quicker delivery, and this is the reason why English looms have gained such a footing in Switzerland, for though they are heavier built than Swiss looms, the latter are as a rule superior in finish.

Preparation machinery on the whole needs little special mention. Winding frames, beam warpers and sectional warpers, whether of English or Swiss make, are very similar, and as a rule firms use English or Swiss preparation machinery according as they have English or Swiss looms. In coloured goods factories the system of Yorkshire dressing is never met with, while a method frequently seen is horizontal sectional warping. In all up-to-date factories beam warping machines are fitted with an automatic stop motion for broken threads, in most cases mechanical. In the winding department Barber knotters, or some similar device, are occasionally employed, but their use is not general. In one department, however, a marked difference exists, viz., in the sizing department. In ordinary grey cloth factories slashers are almost invariably used, either cylinder drying or air drying, the latter often of a German pattern. But in muslin and coloured goods factories the Scotch dresser sizing machine is used. This machine is the best for giving a weaving size to fine or coloured yarns, for it is more even and regular in its effect than ball sizing, and it does not flatten the yarn as slasher sizing generally does. Moreover as the size is not applied hot, it cannot weaken the colours of dyed yarn. The chief disadvantage of Scotch dresser sizing is the small production, so that its use is only profitable in cases where good treatment of the warp is the first essential. It is a system which has nearly gone out of use in England owing to its cost and also to the fact that for most purposes fine yarns may be suitably sized on a slasher if right methods are adopted.

There is little Jacquard weaving, one factory of 360 Jacquard looms exists, and a few such looms are found in some of the ordinary coloured goods factories, but most manufacturers confine themselves to designs obtainable by dobbies and the use of different coloured wefts

Much complaint is made of the scarcity of labour, which it is said can only be remedied by the invention of a more perfect automatic loom. The Northrop loom does not meet the necessities of the case, because, in addition to its high initial cost, it is unsuited for the variety of work done in Switzerland. In the ordinary grey cloth factories, where it would be most useful, the numerous changes and adjustments of the looms would nullify the advantages that might be gained from the Northrop loom under conditions more favourable to its use. On this account it has only in rare cases been found advantageous to employ a warp stop motion on ordinary looms, though this is naturally in more general use than the Northrop loom. Many firms would have to use a better quality of yarn if they introduced warp stop motions, and the increased use by coloured goods manufacturers of American instead of Egyptian cotton has emphasised this consideration ¹

There is only one factory, a small concern engaged in the manufacture of shirtings and printing cloths, which

¹ A manufacturer of this class of goods made careful calculations of the comparative advantages and disadvantages of using American cotton on looms without a warp stop motion with two or in some cases three looms to a weaver in which case he had about a third of his looms idle or of using Egyptian cotton and fitting his looms with an automatic stop motion when he could let each weaver mind four looms, and would be able to keep all his machinery running. He found that it paid him better to continue using American cotton and not to introduce the warp stop appliance especially as he had to take into account that since he makes a variety of articles, the time lost in fixing the appliance each time a new warp was drawn in would go far to neutralise the advantage of having all his looms running. As this manufacturer is in a particularly unfavourable position very few firms having such a large proportion of their looms kept idle through lack of weavers it is easy to understand that in the majority of cases it has not been deemed advisable to introduce a warp stop mechanism, much less an automatic loom.

is equipped throughout with Northrop looms. There are 220 looms and 40 weavers¹. Beginners tend four looms and expert weavers eight looms, and they earn respectively fr 2 and fr 3 per day, the average daily wage all round being about fr 2.50. The number of looms per weaver is very small in comparison with the number of Northrops that would be tended by an English weaver. Nevertheless it is worth while to use them in this factory, which is situated in a somewhat sparsely populated neighbourhood where it has to compete for labour with a silk weaving factory, as it would be impossible to obtain from the local population the number of weavers, probably about 70, that would be required to tend 220 ordinary looms. As would be expected from the fact that there are so few looms per weaver, the division of labour between skilled weavers and unskilled assistants that characterises the employment of the Northrop loom in America, is not found here, each weaver having similar duties to those she would have if tending an ordinary loom. The wages of the weavers are not higher than those of weavers tending ordinary looms. The looms are employed in making medium cloth, of 90 cm wide, and run at a speed of 170 picks per minute. The effective production varies between 70 per cent and 80 per cent using ordinary yarns, but if very good yarn is used, a production of more than 80 per cent is obtained. Though the speed is fairly good for Northrop looms, the effective production is poor, and on the whole it would not pay, under such conditions, to instal Northrops, but for the great scarcity of labour. There are 30 people engaged in preparation work, cloth-looking, etc., and five mechanics, making 75 workpeople in all.

There is no other factory completely equipped with

¹ In Lancashire 40 weavers would tend almost this number of ordinary looms, and in America there are many 6 and 8 loom weavers on ordinary looms.

Northrop looms, but one or two firms have installed a few on trial, and the Gabler automatic loom, for which there is an agency in Zurich, has also been tried. One manufacturer has invented a shuttle-changing apparatus which is in use in his own and in another Swiss factory, and a few looms with this apparatus have also been sold abroad ¹

In the inventor's factory there are 75 looms with the shuttle-changing apparatus, weaving heavy plain cloth for bleaching, of 90 cm wide, and also 100 wide and a few narrow ordinary looms. Weavers mind six looms with the automatic apparatus, but only three ordinary looms. The rate of wages for a 90 cm wide cloth 16 × 16 reed and pick, 16/16 yarns, is fr 3 per 100 m on the ordinary looms and fr 2.40 on the automatic looms. At this rate good weavers on the latter can earn about fr 4 per day, whilst much less is earned on the ordinary looms. The working week in this factory is 64 hours and the looms actually run 62 hours a week. It would seem that under Swiss conditions this shuttle-changing apparatus is at least as effective as the Northrop loom, but neither has been tried sufficiently to warrant a decided opinion.

The methods of humidification employed in the spinning industry are also in use in the manufacturing branch, but a newer and improved method is also employed in some weaving sheds, for when new factories are built it is possible to introduce improvements, which could not well be adopted in old mills. The method referred to may be described as follows —

Air is pumped into a stone chamber, in the basement of the factory, furnished with a number of water jets or sprays. Any required degree of humidity may be

¹ The inventor is Mr J C Zwick, and the apparatus is made by the Maschinen Fabrik, Rüttli, which also has now the exclusive right to manufacture Northrop looms for Switzerland and certain of the neighbouring parts of Europe where it does a much better business in these looms than in Switzerland itself.

obtained by regulating the number of jets playing. Heating cylinders are usually built in the air chamber, so that the damp air can be heated in cold weather. When the air has been brought to the required temperature and degree of humidity, it is pumped from the chamber into canals which convey it either under the floor of the weaving shed or, in the case of high buildings, in hollow buttresses along the walls, and grids in the floor or in the buttresses admit the air into the rooms. When it is not necessary to introduce moisture into the atmosphere, this system may be used simply for ventilating purposes, as by its means the air of a factory can be conveniently and frequently changed. This should be amongst the most hygienic systems of humidification, as the process is necessarily combined with ventilation. Its disadvantage is that it is expensive and cannot be introduced into old buildings without extensive structural alterations. The system is much more extensively used both in weaving sheds and spinning mills in Italy than in Switzerland.

It is not easy to give the exact cost of building and equipping a Swiss weaving factory, because conditions, such as cost of land and rates of building wages, vary in different parts of the country, and the style and class of machinery also vary much from factory to factory, but the following wide estimate may be presented as fairly inclusive of different conditions —

For a factory of grey goods looms—1200 to 2000 francs per loom ¹

For a factory of coloured goods (drop box motion) or dobby looms—1500 to 3000 francs per loom

¹ In the Free Trade League's Reply to the Report of the Tariff Commission the cost of erection of a shed of 800 plain looms in East Lancashire is estimated at about £35 per loom.

SECTION III —*Hand Weaving*

The number of hand looms in the Canton of Appenzell, the chief seat of hand weaving, in 1900¹ was 3,731, of which 3,635 were swivel looms for weaving cloth with a flat-stitch pattern in imitation of embroidery. In that year there were only three small weaving factories in the Canton with a total of 280 power looms, none of them for flat-stitch weaving, but since then a shed has been erected containing about 200 swivel power looms. There are also several flat-stitch hand weavers in the neighbouring parts of Canton St. Gallen, mostly near Rorschach on the Lake of Constance and in the Rhine Valley, and some also in the Toggenburg.

There are about fifty manufacturers or factors, many of whom are very small men, though a few are in a big way of business and employ a large number of weavers. The manufacturers always own the looms and place them out with the workpeople, whom they also supply with yarn. Some of the larger manufacturers possess preparation factories in which they prepare the yarns not only for their own weavers but also for their smaller fellow-manufacturers. But the primitive method of sizing the warps on the loom has not yet entirely died out and provides occupation for the older women in some households. Tacklers are employed to go round to the weavers' cottages and set up the looms and repair anything badly out of order, but minor adjustments and repairs are done by the weavers. Some firms keep a few hand looms in their factories, but these are either Jacquard looms weaving specialities, or looms on which patterns are worked or experiments made in new designs.

As a rule the weavers work in cellars in their cottages, and in the case of large families it is not uncommon to find two or three looms in one cottage. The cellars are

¹ See Report of the Kaufmännisches Directorium of St. Gallen, published 1901. The number has not changed much since.

generally roomy and light, but they are often, perhaps in most cases, very damp, as only too frequently the bare earth serves as floor. While professional weavers who devote the bulk of their time to the work, are in the majority, there are a number of people to whom weaving is only a by-occupation, many men who are employed in agriculture. During most of the summer only weave in winter and in wet weather, and women very often divide their time between weaving and housework. In many families where several of the members take turns at the loom, it is never idle, but in others where only one person weaves, or where during harvest time all must be at work in the fields together, looms may stand idle for long periods. Hand loom manufacturers are therefore at a considerable disadvantage as regards regularity of delivery, and if power looms could produce the flat-stitch effects as cheaply as hand looms, they would be adopted by many manufacturers in order to avoid the unpunctuality and the delays incidental to the present system. But the swivel power loom is complicated and expensive, and at the same time requires so much attention and runs so slowly, that it proves less economical than the hand loom, especially when account is taken of the expense attaching to the erection and upkeep of a comparatively large factory. Probably the workpeople would object to such a change, as it would deprive them of a certain amount of the independence they enjoy at present, but as the factory system would bring their labour under the inspection and protection of the State, it would really in all likelihood prove of considerable benefit to them.

In this branch of weaving a good deal of mixed cotton and silk yarn (so-called "Eisengarn") is used, but mercerised cotton yarn is now taking its place. There are about 1,300 hand looms for weaving silk and half silk "purse cloths" in Appenzell, but though the conditions in this industry are very similar to those

prevailing in that of flat-stitch weaving, it belongs properly to the silk and not to the cotton industry

A generation ago the county of Toggenburg, in Canton St. Gallen, was the seat of an extensive hand loom weaving industry which was mainly devoted to the manufacture of coloured goods, though still earlier fine grey muslin had been the staple article produced, and the general conditions in which were in many respects similar to those existing in Appenzell to-day. But the hand loom and the cottage weaver were gradually forced to give place to the power loom and the factory, and the number of hand loom weavers, which amounted to several thousands about thirty years ago, had dwindled to 425 in 1905. These are nearly all elderly folk, as young people have no inducement to enter the industry, which will probably die out with the present generation of weavers. The hand looms are engaged on coloured goods of a similar class to those made on the power loom, but on patterns for which there is only a limited demand, so that only a small quantity is required to a design.

APPENDIX

TABULATED PARTICULARS OF TEN WEAVING FACTORIES

FACTORY	No 1	N. 2
POWER	Water turbine 100 H P	Water turbine 150 H P
SPOOL WINDING SPINDLES	800 (Barber knotters	800
HANK WINDING SPINDLES	—	—
WARPING MACHINES	7 beam warpers	8 beam warpers
SLASHERS	2	2 English 1 Swiss with size boxes as in Scotch dresser machine
SCOTCH DRESSER MACHINES	—	—
LOOMS		80 cm to 145 cm reed
Plan and Tappet	470	597
Dobby	—	—
Jacquard	—	—
PICKS PER MINUTE	86 5 cm, 210 101 5 cm, 200 127 cm, 190	80 cm 200 102/8 cm, 190 118/24 cm, 180 135/45 cm, 164 80%—82%
EFFECTIVE PRODUCTION	78 /—80%	
OPERATIVES	250—270	300 (whereof 230 weavers)
PREPARATION OVERLOOKERS	—	—
TACKLERS AND LOOM GAITERS	5	8
HOURS OF WORK	11	11
YARNS USED	Medium counts, mostly 38s twist and 44s weft Their own spinning	38s—80s twist, 40s—120s weft. 285 000 k American and 75,000 k Egyptian yarn per annum all their own spinning
CLOTHS MANUFACTURED	Printing cloths from 18×14 to 22×28 reed and pick, average 19×17	50—80 kinds of muslin, printers, and bleaching cloths About 150 looms are on fine and 450 on medium cloths
GENERAL PRODUCTION	5 million metres a year =400,000 kilos	—
DESTINATION	German, Swiss and Austrian calico printers	About one quarter of product to St. Gallen embroiderers, the rest to Swiss calico printers and wholesale houses

No 3	No 4	No 5
Electrical, each loom has a separate motor	Water turbine, 220 H.P. Steam engine 60 H.P. Electric 60 H.P.	Water turbine 120 H.P.
280	760 and 20 cross winding for coarse and doubled yarn	Warp 200 bobbins winding from cops and hanks
—	64 for coloured weft	Weft 300 spindles winding from hanks
4 beam warpers	5 beam warpers 500 bobbins per creel	8 beam warpers and 2 mills for mercerised yarn
—	2 two cylinder and 2 one cylinder machines	1 air drying
6	—	6
234 154 cm reed	90 cm to 300 cm reed	130 have 4 shuttles About half have warp stop motion
—	320, including a few fustian and Turkish towel looms	—
—	50	—
150—160	50 34 of 400 hooks)	380 105 cm to 204 cm reed
70% average 50% min 85% max	—	105 cm 160 128 cm 130 204 cm, 90
120	190 weavers 63 preparation	60 /
—	1	400
3	11	11
10	11	11
80s—140s twist 120s—160s weft Mostly English spinning	6s—45s Swiss spinning	12s—100s twist 6s—120s weft some doubled twist Swiss and English spinning Some linen, wool and silk weft is used Mostly grey yarn, some coloured
Muslin for embroidering, bleaching and mercerising 140 cm wide 92 picks per French inch, and upwards	Fancy Jacquard and dobby cloths, piqués Turkish towels sheetings fustians, medium and wide plain and twill cloths Mostly woven grey, some coloured	Spotted muslins (like Glasgow makes) figured umons (like Bradford makes) fancy figured muslins, fancy cot tons for the East, shawls for Turkey
120—145 metres per loom per week St Gallen embroiderers	In 1905 in 298 working days 2 394,428 metres=530,100 kilos Chiefly home trade also Balkan States and Brazil	— Export direct to Constantinople Smyrna and Sofia, and to Manchester for re export. They sell to Zurich and other Continental shipping houses for India, Manila and South America.

FACTORY	No 6	No 7
POWER	Water turbine	Water turbine steam engine in reserve
SPOOL WINDING SPINDLES	160 (for muslin warp)	540, winding on to pirns from large spools
HANK WINDING SPINDLES	640 warp and 576 weft	200 winding on to large spool from hanks Also winding warp and weft from hanks
WARPING MACHINES	10 beam warpers and 1 sectional warper	16 beam warpers
SLASHERS	1	—
SCOTCH DRESSER MACHINES	3 for grey and 3 for coloured warp	13
LOOMS	Looms have 1—6 shuttles	300 looms have 4 5 or 6 shuttles
Plain and Tappet	94 (150 cm) grey muslin	348, 99 cm to 150 cm cloth
	135 coloured cloth } 107, 125	
Dobby	135 " } 140, 160 cm	54, , , , ,
Jacquard	—	—
PICKS PER MINUTE	Coloured goods, wide 100	Old looms 90—95
	Coloured goods, narrow 130	New looms
	Muslin 150	135 cm 1 shuttle, 185
		135 cm, 4 shuttles 165
		135 cm, 6 shuttles 140
		150 cm 4 shuttles, 125
*		
EFFECTIVE PRODUCTION	50% on coloured cloth looms	55/—60%
	70% on muslin looms	
OPERATIVES	265 in shed 35 in dyehouse, 14 in repairing shop 7 labourers, 80 home workers tending winding frames	180 weavers
PREPARATION OVERLOOKERS	1	1, and 1 yarn controller
WEAVING FOREMEN	—	—
TACKLERS AND LOOM	—	—
* GAITERS	6	8
HOURS OF WORK	11	11
YARNS USED	4s—60s dyed yarns 70s—120s grey yarns Swiss and English spinning Some silk woollen and worsted yarn is used	24s—80s Nearly all their own spinning all yarn dyed outside
CLOTHS MANUFACTURED	Grey muslins coloured cloths for blouses and aprons bed coverlets and mattress covers	Mercerised dress goods, coloured shirtings, fancy apron cloths for home trade run in mercerised stripes and figures for export
GENERAL PRODUCTION	—	2½ million yards a year, value upwards of 1½ million francs
DESTINATION	Muslins to St Gallen em broderers aprons for home trade, blouse cloths for home trade, England, France and Germany, coarse coloured stuffs for India, The Plate, West Africa and Roumania, through Continental shipping houses	Three quarters home trade; one quarter export chiefly to the Lure Lust also Syria and Zanzibar

No 8

No 9

No 10

Water turbine* and steam engine	Water turbine and electric motor The electric power is converted from their own water supply	Electric (own power station), steam, and water turbine
250	1 frame	500 H P 3 000
960 warp and 700 weft	5 frames (1 cross winding) warp 7 frames weft with automatic stop motion	—
8 beam warpers	6 beam warpers, 4 small sectional warpers	20 beam warpers whereof 8 for doubled yarn
1	1 air drying	—
8	11 (not all in work)	16
Most with drop box motion 500 (most narrow and medium)	1 to 5 shuttles	—
—	270	504 whereof 20 are Northrop
135	4 shaft looms with 1 shuttle actual production per 11 hours — 1 metre cloth width 12s weft 55 000 picks 20s 60 000 , 30s 70 000 1.00 cm cloth width 12s weft 40 000 picks 20s 45 000 30s „ 55 000	45 Narrow looms 140 Wide looms, 120 Northrop looms 165
56 4/5		70%
550	180—200 according to labour market	580, including dyeing raising and finishing
1	3	3
—	1	1
10	5	12
11	11, 6½ on Saturday	10
18s twist, 12s—24s weft All dyed in their own works, and all Swiss spinning	20s—50s twist 12s—50s weft All Swiss spinning, dyed and mercerised outside	8s—30s also some linen and woollen yarn dyed (cop and cheese dyeing) in their own dyehouse all their own spinning
Fancy dress goods flannelettes and a few blankets They do all their own finishing and raising	Mercerised blouse goods fancy shirtings, fancy apron cloths (30s twist and weft) coarse mattress covers	Raised suitings and flannelettes coarse workmens blouses and overalls, mattress covers There are 7 raising machines
90,000—100 000 yards per week	—	—
Dress goods chiefly home market, also Levant and Manila Flannelettes and blankets various markets, including Belgium and Holland	Finer goods for home trade, coarse goods for Turkey and Africa	Home trade and Balkan States

CHAPTER IV

RELATED INDUSTRIES

SECTION I —*Dyeing, Bleaching and Finishing*

These industries exist both independently and combined with spinning and manufacturing. There are several small hank and cop dyeing concerns which work for the home manufacturing industry and for export. But specialised dyeworks probably do not dye much more than half the coloured yarn used in Switzerland, as there are dyehouses attached to a considerable number of the coloured goods factories. While many of these dyehouses are very primitive, and equipped solely for hank dyeing by hand, there are others of a modern type and equipped with the newest cop dyeing machines. Still most hank dyeing is done by hand, as owing to the comparatively small lots dyed to a colour, this method pays better than using a hank dyeing machine. For the same reason ball warp dyeing is seldom or never found in Swiss works. Hand machines for printing yarn, to give the appearance of yarns of different colours doubled together, are in fairly common use in dyehouses attached to weaving sheds. Very little cotton is dyed loose, though one firm which does a large export trade in coloured yarn dyes its cotton loose, preparatory to spinning it.

Piece dyeing, unlike yarn dyeing, is not combined with manufacturing. There is one large dyeworks, with an important bleaching department, which turns out about half of the total quantity of dyed piece goods produced in the country, and there are also a few fairly large bleachworks and dyeworks, and several small ones. Many coloured goods factories are equipped with

finishing machinery, and some firms that make flannel-ettes have their own raising machines. Also one dye works and one bleachworks do a considerable business in raising and finishing flannelettes. In the Canton of Appenzell there are a number of bleaching and finishing works mainly engaged in finishing the embroidered muslins and cambrics of St. Gallen and the hand woven flat-stitch fabrics of Appenzell. Most of these works are small, and in many cases goods are bleached in one establishment and sent to another to be finished. A considerable quantity of coloured yarns and piece goods is mercerised, and as piece mercerising especially is of growing importance all the leading piece dyeworks are equipped with mercerising machines.

In all the above-mentioned classes of work the bulk of the machinery used is of German make, coming chiefly from Chemnitz and the Rhine Province. A small quantity of Swiss and English machinery is used, but very little is made in Switzerland, and as German dyeing and mercerising machinery is generally considered much superior to English it is in nearly all cases preferred. The only specially good feature in English mercerising machinery is said to be a clip by a noted Manchester firm.

As in spinning and manufacturing, specialisation is not very highly developed in the dyeing industry, the same firm often performing several different kinds of work, for example, one firm combines dyeing and mercerising muslins with raising and finishing flannel-ettes. Nevertheless some measure of specialisation does exist, hank and cop dyeing being to some extent, and yarn and piece dyeing being generally carried on separately, and the Appenzell bleaching and finishing industries are highly specialised, depending as they do on another specialised and localised industry.

Practically all the yarn dyed, whether for home consumption or for export, is of Swiss spinning, as the

yarns treated are not as a rule of sufficient fineness to render it advantageous to import English yarn for the purpose. In the case of piece dyeing, however, a considerable quantity of grey cloth is imported under the system of "admission temporaire," by which the duty is remitted if the cloth, after undergoing the finishing process, is re-exported to its country of origin. Much English cloth in particular is sent to Switzerland to be dyed, especially sateens for dyeing aniline black, in which Switzerland possesses great advantages, due partly to the excellence of her water and partly to the scientific methods employed. A fair quantity also of English and German muslins is imported for dyeing in colours, the former mostly in the darker shades.

Although the trade in raised cotton goods is not very great and is mainly confined to the home market, a high degree of technical excellence has been attained, due largely to the employment of German machinery and methods. In one works a speciality is made of dyed cotton blankets, raised on both sides, to which the greatest softness is imparted with all the appearance of woollen articles. These are exported to several countries, including the Netherlands.

SECTION II — *Calico Printing*

This industry has its principal seat in Canton Glarus, where there are nearly a dozen printworks, in all of which block printing by hand is the prevailing method. Formerly the number of works was much greater, and Glarus prints formed no small part of the exports of textile goods. Italy and Spain, India and the Philippines were the principal markets, and the industry brought so much wealth to Glarus that the town is said to be the richest in Switzerland, in proportion to population, with the single exception of Basle, and at the same time continuous employment at good wages was provided for the peasantry. But the invention and increasing

efficiency of the roller printing machine struck a heavy blow at the block printing industry. First simple and then elaborate and many coloured designs began to be printed in other countries by the roller machine and turned out at prices with which the hand industry could not compete, and at the same time the advance of Italy as an industrial country meant the loss of an important customer. Owing to these circumstances the Glarus industry gradually diminished. Many printworks were closed, and many were adapted to other purposes, and a considerable displacement of labour resulted. Many cotton spinners and manufacturers who suffered from a shortage of labour, hoped for an influx of operatives from the closed printworks. But the printers had become accustomed to better conditions than the cotton industry proper could offer, and many, rather than enter the factories, preferred to remove to other cantons or to emigrate. But as the population is largely composed of peasant proprietors, the attraction of the soil is great, so that apart from those who have entered the cotton and other factories, the reduced opportunities for work in the printing industry may mean somewhat more work on the land.

However, there are still about 2,000 workpeople engaged in the printing industry, which though reduced is by no means dead. Those firms which survive do so largely owing to their skill in adapting themselves to the changed conditions. As they cannot compete with the roller machine in those classes of goods which can be produced and sold in great quantities and with great regularity, they go in for specialities which the block printer is able to produce more artistically and even more economically than the rival method can. To maintain their position the leading works devote much attention to the bringing out of novelties, and to that end much chemical skill is employed. Some of the more advanced firms are more prosperous than ever they

were and have derived benefit from the disappearance of rival block printers, though some of the more backward firms have a hard struggle to exist

It is strange that the Glarus printing industry clung so tenaciously to its traditional methods and only made few attempts, and those on a very small scale, to introduce the system of roller printing. Only one roller printing works exists in Switzerland, and that is in the Canton of Zurich, the only important calico printworks out of Glarus, though there is also a silk printworks in Zurich. Some of the Glarus printworks have introduced one or two roller machines as a supplement to the usual block printing, but none of them has gone in boldly for roller printing on a large scale. The result has in most cases proved disappointing, for a single machine or even two machines cannot be worked economically, many of the supplementary expenses being as great for an odd machine as for an extended plant. In several cases the owners have therefore felt constrained to sell their roller machines and confine themselves again to block printing. On the other hand, the firm that has undertaken roller printing on a comparatively extensive scale has been successful in printing both for the home market and for export to Germany and the East. However, although Glarus has not achieved much success in roller printing, it has not altogether neglected other mechanical methods of printing cloths. At one works in Glarus, as well as at that in Zurich, perrotine printing is practised. In this method the cloth revolves on a roller and presents a narrow unprinted surface to a stamp. The roller pauses while the stamp, first having picked up the colour from a pad, makes the impression on the cloth. The roller then revolves a distance equal to the width of cloth printed and then pauses again, and so on, till the piece is finished. Printing in several colours can be done on the perrotine machine, which is said to give a bolder and clearer effect than the roller machine, and is therefore

superior where a prominent and distinct design is required. But it is expensive, and its production is only about a fifth of that of a roller machine. Each machine is tended by two persons in Swiss works. Another type of printing machine is used in one of the largest block printing works. This is a French machine printing the cloth from flat copper plates. The whole design is engraved on a plate, which prints successive portions of the cloth as they are passed beneath it. These machines are principally used for printing kerchiefs and shawls.

In most of the Glarus works only the actual printing and finishing are done, the preparatory bleaching being done as a rule in an independent bleachworks. But the largest works in the canton, which gives employment to 600 workpeople, has its own preparatory department, and in addition to cotton it prepares and prints wool and silk. While all the printworks are equipped with both drying and finishing apparatus, a common method of drying is by hanging the cloth out in the open air, as by this means the colours are said to be brought out more brightly and clearly. Most printers have their own designing and block carving departments, in which the pay is generally good, a high class of people being employed.

The staple product of the Glarus printing industry is head shawls, which are used in place of bonnets or hats by people of Southern Europe and the East. They are printed in various styles and designs from the most simple to the most elaborate, including rich red and yellow shades with the colours blending or merging into one another. A good deal of turkey red printing is done, but this is now of less importance than formerly. Very little printing of dress goods is done in the canton, which confines itself rather strictly to its speciality.

A large quantity of the printing cloth manufactured in Glarus is printed in the canton, but a considerable proportion is exported to Alsace under the "admission

temporaire'' and¹ printed in the neighbourhood of Mulhouse. At the same time the Swiss calico printers are allowed to import under the "admission temporaire" free of duty up to 70,000 lumps of cloth per annum to be printed and re-exported. In seasons when the Swiss manufacturing industry is well engaged the printing trade is glad to avail itself of this privilege, and at such times a good deal of English cloth is imported, but in normal years the Swiss manufacturers can produce a fairly adequate supply and the amount of foreign "printers" imported falls considerably short of the permitted 70,000 lumps.

SECTION III —*Embroidering*¹

The export statistics show the important position this industry holds in the country's economy, for the value of the embroidered cottons exported far exceeds that of the exports of any other class of cotton goods. Not only are the exports considerable, but they show a rapid and continuous increase during recent years, largely due to technical advances in the industry, which have rendered possible a vaster production at a lower price and so greatly popularised Swiss embroideries. The commercial centre is the city of St. Gallen where the export firms have their offices and warehouses, but the industry is actually carried on in the country districts of the cantons of St. Gallen, Appenzell and Thurgau, and across the Rhine in the small neighbouring land of Vorarlberg. In the three Swiss cantons there are numerous embroidery factories, and alike in Switzerland and Vorarlberg throughout the country side there are sheds attached to peasants' cottages containing embroidering machines, at which the men work assisted by their wives and children.

¹ See Arthur Steinmann 'Die Ostschweizerische Stickerei Industrie' (Zürich 1905), Wartmann 'Industrie u. Handel der Schweiz im 19. Jahrhundert' and Annual Reports of the Kaufmännisches Directorium of St. Gallen.

Embroidering was introduced into St. Gallen in the middle of the eighteenth century as a hand industry. At first Indian muslins were imported to be embroidered by the women of St. Gallen, Vorarlberg, and Appenzell, but subsequently Swiss muslins took the place of Indian. In the latter half of the nineteenth century the so-called hand machine was invented, and towards the end of the century the "Schiffli" ¹ or automatic embroidering machine was introduced, and its use has extended rapidly of late years. The hand machine is capable of finer work than the Schiffli machine, whose advantage is its great productivity which enables large quantities of cheap embroideries to be turned out. Chain stitch embroidery for curtains is done exclusively on hand machines, other embroidery either on hand or Schiffli machines, but the hand machines used for chain stitch and flat-stitch embroidery are of different types.

In 1900 the number of hand machines in Switzerland was 14,934, exclusive of those employed at chain stitch embroidery for curtains, and the number of Schiffli machines, which was about 500 in 1890, had risen to 2,263. In the same period the number of factories equipped with Schiffli machines rose from 60 to 121, of which 115 were in St. Gallen, Appenzell and Thurgau. Of these 73 contained 8 or more machines, and 42 contained 3 to 7 machines. In the three embroidering cantons there were 9,534 hand machines in the workpeople's houses, and 4,418 in factories. The number of factories was 493, of which 314 contained 3 to 7 machines, there being only 179 factories with eight or more machines. The home industry thus appears to prevail over the factory, and the small factory over the large, because in this industry the gain resulting from large scale production is insignificant in comparison with the outlay required for buildings and other fixed charges.

1 Schiffli is the Swiss form for the German word Schiffchen, "shuttle."

There was a fairly considerable increase in the number of these machines in the possession of working embroiderers in the country in the decade 1890—1900, but a still greater decrease in the number of those installed in factories, as a result of which there was a net decrease of about 3,000 hand machines. This decrease was, however, more than counter-balanced by the increased numbers of the more productive Schiffli machine. The last named machine is generally found in factories and not in the possession of working embroiderers in Switzerland, owing to its great cost, the price of a single machine being about £600, and a motor being required to drive it. But in Vorarlberg both the Schiffli machine and the hand machine are usually found on the premises of the working embroiderers, who can obtain electric power at cheap rates, there was an increase between 1890 and 1900 in the numbers of both types of machine, and in the latter year there were 365 Schiffli machines and 3,878 hand machines in work. Since 1900 the number of embroidering, and particularly Schiffli machines, has greatly increased both in Switzerland and Vorarlberg, especially the former, where many new factories for Schiffli machines have been erected.

The transformation of embroidering from a hand to a mechanical industry brought about a further change, for whereas formerly all embroiderers were women, they are now practically all men, as the machines require a man's strength to regulate them. However, a hand machine requires not only an embroiderer, but also a person to thread the needles, and this is always a woman, and a long Schiffli machine requires two people in addition to the embroiderer, and as a rule one of these is a woman and one a young person. Women, young persons and children are also employed to do miscellaneous subsidiary work. The finest embroidery is still done by hand, and there are about 2,000 women

employed in this work in Appenzell, the principal home of hand embroidering

The number of people employed in the machine embroidering industry in the three Swiss embroidering cantons in 1900 was as follows ¹ (excluding chain stitch embroidering) —

HAND MACHINES		SCHIFFLI MACHINES		
Embroiderers	Needle threaders etc	Embroiderers	Assistants at the Machines	Hand stitchers to correct faults etc
13 555	13 257	2 005	4 055	1 017
18 529 home workers		Mostly factory workers		
8 283 factory workers				

In addition there were 8,652 persons, a large proportion of whom were women and young persons, employed in most cases at their own homes in subsidiary work connected with the industry, such as going over the embroideries with the needle to correct faults, finishing, packing, and other miscellaneous work. There were also 82 people employed in Schiffli machine factories at work not included as embroidering, such as engineers, porters and general labourers. Thus the grand total of workpeople in the three cantons in the machine embroidering industry and work immediately subsidiary to it was 42,623, out of a total population of little more than 430,000. There were in addition probably between 2,000 and 3,000 people engaged in the industry in other cantons, and since 1900 there has been a very great increase in the number of persons employed in tending Schiffli machines.

The chain-stitch embroidery industry gave employment in 1900 to 5,686 people, the vast majority of them

¹ The table is based on figures taken from the Appendix to the Report of the Kaufmännisches Directorium of St. Gallen for 1900 (published in 1901), which contains a most detailed and elaborate statistical description of the industries of the cantons of St. Gallen, Appenzell, and Thurgau, in the form of an industrial census of each district and commune.

women Of these 1,378 worked in factories, of which there were 81, and 4,308 in their own homes The number of machines was 1,917, of which 1,036 were in the embroiderers' homes, and 881 in factories The large proportion of home workers is accounted for by the fact that many women are employed at home on various kinds of subsidiary work for the factories

The national importance of the industry must not be measured by the foregoing account alone, for it is the main cause of the prosperity of the muslin industry, the most flourishing branch of cotton manufacturing, and yarn doubling is to a great extent a subsidiary industry to that of embroidery, while the bleaching, dyeing and finishing industries are also very largely dependent on it

CHAPTER V

COMMERCIAL ORGANISATION

PERHAPS the principal difference between the commercial organisation of the cotton industry in England and Switzerland is that in the latter country there is no raw cotton exchange, nor any elaborate mechanism for dealing with the distribution of raw cotton, such as England possesses in the Liverpool cotton market. The Swiss Spinners' Association is represented on the Bremen Cotton Exchange, but of course this is a German institution, and its importance to Switzerland is not very great. In the absence of a Swiss cotton exchange, which is rendered impossible by the comparative smallness of the industry, spinners buy their raw cotton either direct from America or Egypt, or from Liverpool, Bremen or Havre. The purchases are effected either by means of direct correspondence between the spinner and the seller, or through cotton agents in Zurich or Winterthur. As a rule the agents represent American firms, as spinners usually deal direct with European firms, but some English and German firms are represented by agents in Switzerland. Spinners of course make their purchases in the market most favourable to them at the moment. Thus in the latter half of 1906 Switzerland was buying a good deal of cotton from Bremen and Havre, where it was temporarily cheaper than in Liverpool, as heavier stocks were held. On the whole Swiss spinners prefer to buy their cotton from America, either direct or through the Zurich agents, to buying in Liverpool, as it is said that the arbitrage in Liverpool is not exact enough. Spinners buy at longer intervals and carry heavier stocks of cotton than

in England, but in recent years there has been a marked movement in the direction of the English system

The practice of selling yarn through agents is not so general in Switzerland as in England. Probably Swiss manufacturers buy most of the local yarn they use direct from the spinners, though a good proportion of the yarn transactions passes through the hands of agents, who sometimes sell for the spinners on commission and sometimes act as merchants. English yarns are usually bought either through Manchester or Zurich yarn agents.

The methods of carrying on the cloth business differ from those in vogue in England mainly in two ways, the grey cloth agent does not interpose between the manufacturer and the wholesaler as in England, and selling is not concentrated at one great seat of commerce where goods are warehoused. No such centre as Manchester exists in Switzerland, goods being warehoused in the factory and sold from it direct, so that the line of demarcation between manufacture and distribution is much less clearly defined than in England.

As regards the home trade, grey cloth manufacturers sell to wholesale houses who get the cloth dyed or bleached and then distribute it to the retailers. Sometimes large retail houses buy direct from the maker and have the cloth finished themselves, but this is unusual. Manufacturers of grey and coloured goods employ travellers to visit the wholesale houses and the large retail firms, and there are also agents in some of the principal towns, who represent both Swiss and foreign manufacturers. But more cloth is sold by the makers direct than through agents. Cloth for printing and embroidering is usually sold by the manufacturer to the calico printer or embroiderer, who both finishes and markets the cloth himself. Printing for the manufacturer is occasionally done, but not as a rule.

With regard to the export trade practice varies

Manufacturers export a good deal to Turkey and the Balkans direct, and also to India and the Philippines. But a large part of this trade is done through shipping houses in Zürich, Paris and Genoa, and some also through London and Manchester houses. Practically all the trade with South America is done through shipping houses, while export to European countries is mostly done direct. A small trade in fancy goods is done with English manufacturers who buy Swiss goods for re-export. The trade in printed and embroidered goods is carried on directly between the printing and embroidering firms and the foreign importers. The principal markets for prints are India and Turkey, and in this branch of the trade very long credits are given, six and even twelve months terms being not unusual. Naturally manufacturers who export direct are bound to give far longer credits than those who sell to shipping houses.

The organisation of the embroidery trade and industry presents distinctive features and requires separate consideration. In the first place there are the export firms, who possess warehouses and offices and employ their own designers, who are usually well paid, good men receiving about fr 10,000 to fr 12,000 (£400 to £480) per annum. These firms buy the material, usually muslin or cambric, and give it out together with the designs to "Fergger" or factors to get embroidered, and they in turn give out the work to owners of embroidery factories or to individual embroiderers. The latter generally own their machines, but sometimes they rent them from the factor or some other person.

As the manufacturer pays his workpeople at the same rate as the factor pays the independent embroiderers, he has to make up for his outlay on buildings and his other capital charges by the economies rendered possible by working on a larger scale, such as the employment of time-saving needle threading machines, the ability to

purchase yarn cheaper through buying in larger quantities, and so forth. Very often the manufacturer is himself a factor, and after providing sufficient work for his own machines gives out the surplus to cottage embroiderers.

The case of the large Schifflí machine factories is different from that of the smaller Schifflí and hand machine factories, for they either belong to export firms or deal direct with them, and not through factors, so that much greater concentration of functions exists.

The home weaving industry of Appenzell is somewhat similar to the hand machine embroidering industry on the commercial side. The export firms of St. Gallen sell flat-stitch woven fabrics as well as embroideries, and give out the work in the same way to factors. But in the weaving industry the factor is always also the manufacturer and owns the looms on which the cloth is woven. When the woven and embroidered goods are delivered to the St. Gallen firms, the latter send them out to be bleached or dyed and finished. Finally the bulk of the stuff is exported, the largest customers being the United States and England.

To facilitate business there are cotton exchanges in Zurich, St. Gallen and Glarus, where those engaged in the different branches of the trade can meet.

CHAPTER VI

LABOUR AND INDUSTRIAL ORGANISATION

SECTION I—*Classes of Workpeople*

Switzerland having no large cotton manufacturing towns, has no such factory population, born and bred to the cotton industry, as that of Lancashire. Formerly the cotton operatives nearly all belonged to peasant families living in the neighbourhood of the factory. Agriculture was the main occupation of the parents, while the children, or such of them as could be spared from work on the land, found employment in the factory, their wages usually going to swell the family income. Although this is by no means so uniformly the case now as it once was, it is still true that in all parts of the country a considerable proportion, and in some districts the bulk, of the cotton operatives belong to the land-owning peasant class. In some of the more predominately agricultural districts many of the workpeople leave the factory for a time in the summer to work on the land, returning to the factory for the winter. This causes some dislocation of business, though owing to the fact that the summer is a comparatively slack time for the industry as a whole, this is not so serious as might be imagined. Where the wages earned in the factory are not merely a supplement to the family's income derived from agriculture, but form the principal means of support, the operatives frequently possess their own houses and patches of land, especially in Canton Glarus, so that there is no such absolute divorce between agriculture and industry in Switzerland as in England. The majority of home workers, whether

embroiderers or hand loom weavers,* also belong to the class of peasant proprietors

But it has been for some years increasingly difficult to obtain a sufficient number of cotton operatives from this class. On the one hand the peasantry has become more prosperous through the growth of agricultural co-operation, and on the other hand new industries have arisen which offer greater attractions than the cotton industry. Particularly, the rapid growth of the embroidering industry, and to a less extent, the development of silk weaving from a home to a large scale factory industry, have provided careers in which the better class of workpeople can earn higher wages, under more agreeable conditions, than in the cotton industry proper. At the same time the engineering industry attracts a growing number of the best class of male workers, while the daughters of well-to-do peasants prefer the more genteel callings offered by the large and growing hotel industry, to the dirtier and more monotonous work of the cotton factory. As a rule only people who cannot find any other skilled occupation are willing to work in the cotton factories, in contrast with the position in England where cotton operatives hold a leading place in the ranks of skilled labour.¹

Cotton manufacturers must therefore be content with an inferior class of operatives, except in districts where no considerable competing industry is established, and even there the attraction of the towns, with their higher wages and more varied pleasures, draws away many of the most enterprising workpeople. And it is impossible to obtain enough native workpeople, even of an inferior type, to keep the machinery running, and indeed in brisk times other industries also complain of the inadequacy of the labour supply. Consequently manufacturers, and above all cotton manufacturers, have been

¹ For example, in England cotton weavers earn higher wages than silk weavers, whereas the contrary is the case in Switzerland.

compelled to bring in large numbers of foreigners, especially Italians, to fill the gaps in the ranks of labour. Many entire families of foreign, mostly Italian, working people are attracted to Switzerland, the men finding employment at road making, building and navvying, while the women work in the factories. Besides these immigrant families manufacturers have found the need of additional supplies of female labour, which they have also got from Italy. In order to house the girls it has been necessary, in addition to other measures, to build homes, of which there are over twenty in the first factory inspection district, providing accommodation for upwards of 800 women and girls, nearly all employed in the cotton or the silk industry.

In one branch of the cotton industry, however, it is not necessary to depend on inferior or immigrant labour, namely, in the fine muslin manufacturing industry of Wald. Here is found the nearest resemblance to the hereditary class of cotton operatives of Lancashire, for hand loom weaving was carried on in Wald long before the era of mechanical inventions, and for half a century the village has been the centre of the manufacture of muslin on the power loom. Hence a race of weavers has grown up with a tradition of special skill, and the district has also become the seat of important textile engineering works and silk factories. The neighbourhood is primarily industrial, and the people, though villagers, belong not to the peasant but to the factory operative class. In this respect Wald and district differ from the coloured goods manufacturing districts of Aargau and even of Glarus, for in the former, though cotton manufacturing is a long established industry, the main character of the country is more agricultural than industrial, and weaving is a secondary pursuit of a population of peasant proprietors, and in Glarus, though the cotton industry is of long standing and has great traditions, yet there is far less concentration than

in Wald, there being generally one factory in each village instead of several factories in one village, and the operatives that is, the natives as distinct from the immigrants, are mostly members of peasant families and often have their agricultural work to do in the evening after the day's work in the factory is finished

SECTION II — *Efficiency of Operatives*

Labour is much less effective in Switzerland than in Lancashire, and more work-people are required to tend the machinery. This is in part due to the different conditions of work in the Swiss industry but it is largely due to the inferiority of Swiss operatives, who though thorough and careful, are much slower and less expert than English. There is a good deal of variation between one mill and another, due to the kind of work done and other considerations, but there are always more work-people per pair of self-actors in a Swiss than in an English mill. Whereas in a mill spinning medium counts in Lancashire one spinner and two piecers would tend a pair of mules of 1,250 spindles each, in Switzerland five or even six operatives would be required for a pair of mules of such length, save in very exceptional cases, though some of these would be females, for the employment of women as piecers is not uncommon in Swiss mills, and it is quite usual to have women or girl creelers. A similar excess over the English standard in the number of operatives required prevails in the preparation departments of spinning mills.

The average number of operatives per 1000 spindles was 6.79 in 1888 and 6.25 in 1905,¹ and even in a first-rate mill the number to-day is rarely less than five operatives per 1000 spindles, which compares very unfavourably with the number usual in England, namely, two or three per 1000 spindles. But it should be observed that the disparity in the number of operatives

¹ See p. 12.

is in part due to the facts that on the whole more reeling is done in Swiss than in English mills, and that the workpeople employed in the repairing shops are included in the Swiss figures, whereas repairs are generally sent to be done in engineering works in England

The usual proportion of labour to machinery in the different operations of a Swiss spinning mill is as follows —

Opening 1 man per machine

Scutching 1 man per 1 inter and 1 finish Scutcher

Carding 6 to 8 engines per man (including grinders and strippers)

Drawing 1 girl per frame of 3 heads and 4 deliveries,
1 or 2 girls per frame of 3 heads and 5 or 6 deliveries

Fly frames 1 slubber per woman and 1 inter frame per woman, 2 roving or Jack frames per woman, usually with 1 girl doffer per pair or per 2 pairs

Ring frames Usually 400 to 500 spindles per girl,
extreme limits 300 to 600 spindles per girl

Mules Short mules—1 spinner, 1 piecer and 1 creeler per pair, long mules—1 spinner, 2 piecers and 1 or 2 creelers per pair

A similar state of things exists in the weaving branch of the industry Whereas in England an average weaver tends four looms,¹ and there are many men and some women in the Burnley district who tend six plain looms, in Switzerland an average weaver tends three plain looms, only very expert women as a rule tending four looms In Swiss factories women rarely mind four fancy looms, though men sometimes do so The average number of looms per operative, including all

¹ According to the Board of Trade Report on Earnings and Hours (Cd. 4545), of the weavers of whom reports were received 28,508 women and girls tended 4 looms each, 18,951 tended 3 looms and 10,851 tended 2 looms; 11,387 men weavers tended 4 looms, 1,825 tended 6 looms, and 1,433 tended 3 looms.

operations, is two in Switzerland¹ and about three in England

The usual proportions of machinery and labour in Swiss weaving factories are as follows —

Winding 25 spindles per girl or woman

Warping 1 machine per woman

Sizing Scotch dresser machines—1 per man, Slashers—
1 per man and assistant

Drawing in 2 women or girls per frame, 1 e, 1 drawer
and 1 reacher at equal wages

Weaving 2 or 3 coloured or Jacquard looms per weaver,
occasionally 4 coloured looms per weaver, 2 wide or
3 narrow muslin looms per weaver, usually 3, often
4, sometimes 2 plain looms per weaver

Weavers are in the proportion of about 4 women to
1 man

Tacklers In grey cloth sheds 80 to 90 looms per tackler,
or 120 looms per tackler and warp gaiter In
coloured goods sheds 45 looms per tackler, or 75 to
100 looms per tackler and warp gaiter In many
sheds there is 1 warp gaiter to 2 tacklers

Swiss operatives would often like to tend more machines, in order to earn higher wages, but are not allowed to do so, as they would turn out faulty work. In other cases, however, the workpeople when asked to try and manage more machines, refuse to do so, on the ground that they would be over fatigued. This is especially the case with those workpeople who have agricultural work awaiting them when they leave the factory. "How," they ask, "can we attend to our cattle or our potatoes, if we are dead from a hard day's work in the mill?"

SECTION III — *Management*

Most Swiss factories are family concerns, and it frequently happens that a father and son, or two brothers

¹ See p 90

are partners. In such cases one partner usually acts as commercial manager and the other as general works manager. If there is a single owner of the factory, he usually acts as commercial manager and employs a general works manager, unless the concern is a very small one, when he manages everything himself. Subordinate to the general works manager, who corresponds to the manager of an English mill, is the head overlooker, or inside manager, as he would be called in England. Subordinate to him again in spinning mills, are overlookers of the various preparation and spinning and reeling departments. In small mills, however, there is often no inside manager, but only one overlooker for spinning and one for preparation, both directly responsible to the manager.

In the case of combined spinning and weaving concerns, there is a general works manager who superintends both the mill and the weaving factory, and under him are one inside manager for spinning and one for weaving. In weaving factories there are usually one or more overlookers of the preparation work, and in coloured goods factories, where a great number of operatives are employed, there is frequently an overlooker for each preparation department, and sometimes also a weaving room foreman overlooker who is equally with the preparation overlookers subordinate to the inside manager.

The number of overlookers varies very much according to the class of work done and the character of the labour employed. But generally it will be found that even in the most favourably situated Swiss mills the number of overlookers in proportion to the number of spindles is in excess of the number in an average English mill, where there would be only one spinning and one carding overlooker, the latter with an assistant, for 60,000 to 80,000 spindles. In weaving factories the difference is less marked, but still the number is on the whole greater.

than in England. This is to a large extent due to the greater varieties of cloth woven in Swiss factories.

While the rank and file of the labour employed in the Swiss cotton industry is inferior to the English operative class, this is by no means the case in the higher grades. A large number of millowners, especially those who act as works managers, have spent a considerable time in England, or in some cases in America, studying the technical aspect of the industry. Most of them receive a good technical training at home before coming to England, where they work in textile engineering works or in cotton mills, and sometimes in both, and many add to a practical training of this kind, theoretical studies in the Manchester School of Technology. At the same time they are able to learn a good deal of English commercial methods. The result is that the average standard of technical and general knowledge is much higher among Swiss than among English mill managers, the former by their practice of working in engineering works gaining a far more thorough knowledge of textile machinery than those who merely understand its manipulation. Many managers and inside managers of factories, and people of similar standing, send their sons to the excellent Weaving School at Wattwyl which receives a subsidy from the Spinners' and Manufacturers' Association. Here the students receive a thorough practical and theoretical training in weaving, including design, fabric structure and kindred subjects. When they have finished their course, they are able to find positions in factories, from which they may eventually rise to be managers, and there are many former students who are now managing factories outside Switzerland.

The high technical attainments required of head managers render it almost impossible for men to rise from the rank of operative to that position, especially as there is not, as there is in Lancashire, a race of skilled cotton operatives from whom men of exceptional skill in the

industry might naturally emerge. Nevertheless, the position of inside manager in Swiss factories is frequently held by men who have risen from the ranks.

There are no technical schools for cotton factory operatives, but at Teufen in Canton Appenzell there is a Hand Weaving School for training boys for the local industry. The students are taught both the art of weaving and also enough of the structure and mechanism of the loom to enable them to keep their looms in order and to do minor repairs. The fees are very low, and the school receives a subsidy from the Hand Weaving Employers' Association.

CHAPTER VII

SOCIAL CONDITIONS

SECTION I — *Housing*

Those operatives who belong to the land owning peasantry own their houses and are hence in a better position than English operatives, as they have no rent to pay. But there is an increasing proportion of non-landowning workpeople employed in the cotton industry. Some of these rent houses in the mill villages, and some rent a tenement or set of rooms in a peasant's house which has room for two families. But housing accommodation in the country, where most of the factories are situated, is naturally scarce, and hence the influx of non-native workpeople has created a difficult problem, for the new-comers do not for the most part supplant but supplement the original population. The problem is aggravated by two facts, first, that the number of persons per family is diminishing, so that to the same number of inhabitants there is a greater number of families, and second, that the new generation demands better accommodation than did the last.

Manufacturers have solved the problem by going in largely for building houses, which they let at moderate rents to their workpeople. In most cases each house contains four dwellings, *i e.*, it is like a building containing two English semi-detached houses, but with the ground floor arranged as one complete flat and the first storey as another flat, sometimes the style is exactly that of English semi-detached houses, and occasionally large tenement houses are built, flats being let to families just as in the towns, but this style is very rare.

A dwelling usually contains a kitchen, a living room and two or three bedrooms, and also a cellar where the

wood for fuel (coal is rarely or never used) is kept. In addition nearly all dwellings have gardens or plots of land of the average size of about 500 square metres, in which the tenants grow potatoes and other vegetables. It is quite usual for workpeople to supply their whole requirements in the way of potatoes and garden produce throughout the summer from these gardens, which also provide them with a congenial occupation outside factory hours. Water is always laid on for these dwellings, and is included in the rent. As a rule gas is not provided, and the tenants use oil lamps for lighting purposes, as the peasantry do in their own houses. Sometimes, however, when the factory is lighted by electricity, electric light is supplied to the houses. For this an addition of about half a franc a week is made to the rent.

Sometimes the houses are built of stone, but more often of wood, after the fashion of Swiss peasants' houses and also of more pretentious chateaux, wooden houses being considered warmer and more comfortable than stone ones. The dwellings are as a rule roomy and well finished and afford quite as good accommodation as the best workmen's houses of Lancashire industrial towns, and the buildings are much pleasanter to look on than the monotonous rows of houses common in the North of England.

Nearly all large cotton firms own such houses, which are usually let to families several of whose members work in the factory, and in a few cases the manufacturers also hire out the furniture. Rents are generally paid fortnightly or monthly, but are usually calculated by the year. The most general rent for a house with a kitchen, three other rooms, cellar and garden, is fr. 130 per annum, and for a similar house, but with four rooms besides the kitchen, fr. 150 to fr. 200 per annum, of course there are variations according to the style of the house and the locality, land and building being more expensive

in some districts¹ than in others. Thus for 3 francs, or less than 2/6 per week, to 4 francs, or 3/3 per week, a Swiss cotton operative gets a better house than a Lancashire operative could get for 4/6 to 6/6 per week.¹

Manufacturers usually reckon that they get 4 per cent per annum on the capital invested in workmen's houses. Of course from the money point of view this is not a big return on industrial capital, but from a broader view the outlay is remunerative, because without a sufficient supply of labour, which must be adequately housed, industry could not be carried on at all. Still, the Swiss manufacturer is in this respect certainly at a considerable disadvantage compared with the English manufacturer, who owing to our centralised industry can be sure of his labour supply without having to lay out thought or capital in housing it.

At least one firm lets houses to its employés on the Mulhouse system, that is, that after 20 years the house becomes the tenant's property. If the tenant leaves before the end of the 20 years, he can transfer his rights to the next tenant, or get from the firm a return of the part of his payments that represents not rent but purchase money, for example, if fr 15 are paid per month, fr 10 might be rent and fr 5 purchase money.

SECTION II — *Mill Boarding-Houses and other Facilities provided by Millowners*

Some firms maintain homes or boarding houses² for girls employed in their mills, many of which are exclusively for Italian girls and are managed by Roman Catholic sisters. When the firm requires workpeople, the sisters write to a parish priest in Italy with particulars of the vacant situations. The priest lets it be known that work is to be had, and then a party of girls go

¹ The particulars given are based on information I collected in a great number of cotton manufacturing villages. Rents in the towns are much higher.

² See p. 67.

together to fill the places offering. The following is a description of two of these homes, one in Canton Aargau and one in Canton St. Gallen. Both are clean and comfortable, though plain. In each there are a large common dining room and a common sitting room. The girls sleep in dormitories, but each has her own separate cupboard for her belongings. Cooking and general household work are done by the sisters, but each girl has to do her own washing. The homes are well aired and heated and are lighted by electricity, and there is a garden attached to each. The diet is fairly similar in both of them. For breakfast there is coffee and milk with bread and butter, for dinner there is soup every day with meat on alternate days, and on alternate days polenta, macaroni and cheese, preparations of rice, and so forth, and in summer also salads, are provided, for supper there is either the same as for breakfast or milk soup (a preparation of milk and meal) with bread. This diet is at least as varied as the girls would get at home, and is plentiful and good of its kind. There are 50 girls in one of these homes, where they pay 90 centimes (under 9 pence) per day for board and lodging, and 20 girls in the other, who pay 80 centimes a day. Some firms which employ a number of girls coming from other districts, own large houses where a number of girls live and club together for their board. The firm as a rule provides a cook for each house, but otherwise the girls manage for themselves. It is obvious that the girls enjoy more liberty under this system, but it is not so certain that they enjoy more comfort.

Manufacturers are sometimes compelled to keep cows to supply milk to their operatives. This is particularly necessary in the case of mills situated in remote places. As a rule the milk is sold at the price usual in the canton, but sometimes at specially cheap rates, the lowest price at which it is supplied is 18 centimes a litre.

A function which will seem less strange to English mill-owners is the provision of heating apparatus for the operatives to warm food that they have brought with them to the factory. This is usually used for milk or coffee and milk that the female operatives bring to drink in the middle of the morning and sometimes also in the afternoon. The male operatives make less use of this provision, as they usually take beer, wine or cider to drink. It is not at all unusual for men and women to take bread and cheese or sausage to eat with their drink, but these of course do not need warming. The work-people only take about ten minutes for this refreshment, and the machinery does not stop running.

Less frequently, but still fairly often, the people take their dinner to eat at the factory, though they prefer to go home if possible. A dining room must by law be provided for those who stay for dinner, and sometimes the heating apparatus is in this room, sometimes, however, there is one on each floor for the greater convenience of the operatives. A variety of kinds of warming apparatus is used, troughs with hot water are frequently found, also electric and gas stoves. Occasionally no special provision is made, and the people use the steam boiler to warm their food, but in such cases the factory inspectors always urge the installation of a proper heating apparatus. Wash basins and soap are generally provided.

SECTION III — *Standard and Cost of Living*

The standard of living of Swiss cotton operatives is decidedly lower than that prevailing in Lancashire. Both from character and necessity the Swiss is more frugal than the English operative, especially as regards expenditure on meat and amusements. It is probable that the general standard of living of skilled workers is higher in England than in Switzerland, but whereas the standard of the English cotton operative is higher than

the average in his country, that of the Swiss cotton operative is lower

Whilst the standard of living in the English cotton industry does not vary much between such centres as Bolton and Oldham or Blackburn and Burnley, in Switzerland the difference between country districts, such as those of Canton Aargau, and the industrial villages round Zurich and Winterthur is great. In most countries more meat is eaten in the towns than in rural parts, and this holds good both in England and Switzerland, so that it is natural that the English town-dwelling cotton operative should eat more meat than his rural or semi-rural fellow in Switzerland. In the neighbourhood of Zurich and Winterthur the working-class families, including cotton operatives, usually eat meat every day for dinner, while in the country districts meat is but rarely eaten. In Switzerland as in England beef is the kind of meat generally preferred. But unlike the English housewife the Swiss usually boils the beef, so that two courses are got from it, soup and meat, which with vegetables and bread form the usual working man's and indeed also middle-class dinner.

In the remoter country districts there is a good deal of difference between one part and another. In the cotton manufacturing villages in the south of St. Gallen meat is eaten from twice to four times a week, but in Aargau it is in most families only eaten once a week. In Glarus, again, custom varies, some families eating meat comparatively frequently, though rarely every day, while others have it only on Sundays. On the whole, however, more meat is eaten now than formerly,¹ though the price of beef has risen within the last few years from 70 or 80 centimes to 90 cts or 1 franc per lb. To compensate for the smaller quantity of meat eaten in the

¹ This information was obtained from different manufacturers and workpeople, and has been confirmed by the butcher in a cotton manufacturing district. Exact statistical evidence is not available.

country, far more eggs, cheese and butter are consumed, especially by the land owning peasantry, the better-to-do of whom also occasionally kill poultry. Those families that possess goats enjoy a plentiful supply of milk, but cow's milk is mostly sold or made into cheese. In many districts where but little fresh meat is eaten, the people eat a good deal of sausage, which is cheap, and of which the Swiss are very fond. But among the majority of the Aargau operatives and a large proportion of those in Glarus and other cantons the diet compares very unfavourably indeed with that of Lancashire work-people. Potatoes form a most important item of their diet, which consists in addition during the week only of bread, butter and cheese with coffee and cider. The daily fare in many families is as follows —Breakfast bread and cheese and coffee, dinner roast potatoes and butter or fat with bread and coffee or cider, supper same as dinner, it is usual also to take some refreshment in the middle of the morning and in the afternoon¹. On Sunday there is meat for dinner, but not always fresh meat. Many peasants periodically kill a full grown pig and smoke it in the chimney, on Sunday, and occasionally in the middle of the week, some of the flesh is cut off for dinner, and this is all the meat that some of the poorer families get. One pig may last a family six months. A large quantity of beer and cider and a fair amount of wine are drunk by Swiss working men, and to a less extent by women, with whom, however, coffee is the favourite drink.

A considerable proportion of the operatives' food is grown by themselves on their own plots of land, but of course a great part must be bought. On the whole the prices of foodstuffs are probably somewhat lower in Switzerland than in England in spite of the fact that Swiss prices have risen considerably in the last thirty

¹ Cf p 79

years Bread, however, is for the most part dearer, though prices vary most strangely from one town to another, being in some but little, if at all, higher than in England Both wheaten and rye bread are eaten, the latter being preferred by many people, but wheaten bread is the staple kind

A list is given below of the prices of some of the most important foodstuffs in five towns, based on an article by Herr C Zuppinger published in the *Journal de Statistique Suisse* for 1907 These prices refer to October, 1907, and most of them are higher than in November, 1906 For purposes of comparison some similar information relating to five Lancashire towns is abstracted from the Board of Trade Report on "The Cost of living of the Working Classes," published in 1908 The prices are those current in October, 1905 The English towns selected are all actual centres of the cotton industry, but the Swiss towns are typical of urban German Switzerland generally, but not of the cotton districts in particular, since this industry is not carried on in towns but in villages However, the towns given are the chief towns of cantons where the industry is carried on Probably the prices of eggs, potatoes, butter and cheese would be lower in the actual cotton manufacturing districts, but beef would be dearer Fruit and vegetables are on the whole cheaper in Switzerland than in England, but there are no available figures to illustrate this Bacon is largely eaten in England but not in Switzerland, where its place is taken by sausage These articles are of course much cheaper than fresh meat

LIST OF PRICES IN SWITZERLAND AND IN LANCASHIRE ¹

TOWN	BEEF per $\frac{1}{2}$ kilo centimes.	MILK per litre centimes.	BUTTER. per $\frac{1}{2}$ kilo francs.	CHEESE per $\frac{1}{2}$ kilo. centimes.	BREAD per ka. ² centimes	EGGS per fr 1 25	POTATOES per 9 ka. centimes
Aarau	90	22	1 40	50—95	76—80	9—13	24—30
Berne	90—100	23	1 50	70—80	64	13	18—21
Glarus	95	22	1 60	70—90	82	10—12	30—36
St. Gallen	100	21—22	1 45—1 50	—	80	10—13	36—48
Zurich	95	22—23	1 60	75—90	70	8—13	24—30
	per lb. pence	per quart. pence.	per lb shillings	per lb. pence.	per 4 lbs. pence.	per 1/0	per 7 lbs. pence
Blackburn	8—10	3	1/0—1/2	7—8	—	14	2 $\frac{1}{2}$ —2 $\frac{3}{4}$
Bolton	8—10	3	1/0—1/2	7—8	4—4 $\frac{1}{2}$	12—16	2
Burnley	9—12	3	1/0—1/3	7—9	5	10—12	2 $\frac{1}{2}$
Manchester	8—12	3—3 $\frac{1}{2}$	1/0—1/2	7	4 $\frac{1}{2}$	10—12	2 $\frac{1}{2}$ —3 $\frac{1}{2}$
Oldham	8—11	3	0/11—1/3	7—10	4 $\frac{1}{2}$	10—12	4

Swiss workpeople are as a rule well and neatly clothed, and the women especially seem to pay more attention to a tidy appearance when at work than do English women of the same class. Many women belonging to peasant families possess very handsome dresses for Sunday and holiday wear, which are generally the traditional local costumes of their cantons. Some of these are very beautiful, and those of Appenzell are especially worthy of mention, the women in that canton possessing fine embroideries, usually of their own work.

1 This list is useful for the purpose of giving a general impression of the cost of foodstuffs but too much reliance should not be placed upon it and it cannot be made the basis of an accurate comparison between Switzerland and Lancashire. The Lancashire prices are all on the low side and presumably refer to the qualities which would be bought by the poorer class of workpeople, especially as regards butter cheese and potatoes though not as regards beef and milk. The variations in price between the five towns are due less to difference in local conditions than to the fact that different qualities are referred to. This is especially so in the case of potatoes and in that of cheese. The price of bread has risen considerably since 1905. In the portion relating to Switzerland I have given the prices for the qualities of cheese and bread that correspond most closely with the English qualities but the prices of the other articles refer to average and not merely to inferior qualities.

2 Shin and other inferior parts can be bought for from 4d. or 5d. to 7d per lb both in Switzerland and Lancashire.

3 $\frac{1}{2}$ kilo = nearly 1 lb. 2 ozs., 1 litre = over 1 $\frac{1}{2}$ pints, or nearly 1 quart
2 kilos. = nearly 4 lbs. 7 ozs. 3 kilos = about 6 lbs 10 ozs. fr 1 25 = one shilling

or inherited from their parents. Many, too, possess good jewellery and silverware, which are handed down from generation to generation. But Swiss working and peasant women never attempt to dress fashionably, being content to wear the costume of their class, and even when dressed in their best going bareheaded, for hats and bonnets betoken the middle-class. Swiss working men as a class are better and more tidily dressed than English on week days but not on Sundays.

Most woollens must be imported from Germany, England or France, the woollen industry of Switzerland being small, and high class clothing is somewhat dearer than in this country, but workmen's suits are offered for sale in working-class districts at prices not very different from those current in England. While Swiss workmen wear a good deal of cheap ready-made clothing, much of it imported from Germany, they also buy more expensive suits made of good materials, for they prefer to economise in their food rather than in their clothing. Naturally a good deal depends on individual taste in this matter, and it is not always possible to know if suits sold at the same price in Switzerland and England are of equal quality. Still it may be stated without much rashness that Swiss workpeople are well and not very expensively clothed. In regard to boots and shoes the Swiss are in about as good a position as the English, both in the matter of price and quality.

SECTION IV — *Co operative Stores and Thrift Agencies*

Co-operative stores exist in considerable numbers in Switzerland, both in the towns and villages. Their origin was various, but they all tend nowadays to approximate to the "Rochdale plan." The principal societies are now united in two great federations, the General Union of Swiss Co-operative Stores, with its headquarters in Basle, and the Union of East Swiss

Co-operative Societies, with its headquarters in Winterthur¹

Many of the village stores were originally founded by or with the assistance of manufacturers, particularly cotton millowners, to enable their employes to obtain necessaries at cheap rates, but most of these have been taken over entirely by the workpeople of the neighbourhood, whether belonging to the firm with which the society was originally connected or not. The following observations are quoted and translated from the Reports of the Federal Factory Inspectors for 1904-5, published by the Swiss Department of Industry, 1906 —

“ In the (First) Inspection District there are now only six stores in close connection with factories, of which five were founded by the cotton spinning firm Vormalis Hch Kunz, while the sixth was formed by the workpeople of a large silk weaving factory. But these societies are not absolutely closed and confined to the workpeople of the factories in question. The rules of the Kunz societies allow the committee the right also to admit other people, and goods are sold as well to non-members, who share in the profits equally with members. The other society is a limited company to which only workmen in the factory can belong, but as in the other case they do not confine the sale of goods and the sharing of profit to themselves.”²

“ The societies of the six factories with about 2,200 workpeople had together made sales in a year of 935,000

1 For a fuller account see Fay, *Co-operation at Home and Abroad* also Lloyd and Hobson, *The Swiss Democracy*, ch. xii.

2. On p. 319 of Fay's *Co-operation* occurs the following passage: “ They (non members of stores) receive no share in the dividend except in England, where they receive it at half the ordinary rate which only has an economic justification in so far as it is an inducement to qualify for membership.” The author would thus seem to have overlooked the Swiss practice here described. He mentions on p. 309 that the *Unione Co-operativa* of Milan distributes profits according to trade, at an equal rate, to members and non members alike.

francs,¹ and over and above amounts written off, interest, salaries and expenses, 108,780 francs were divided amongst the purchasers, who thus received back up to 15 per cent on their outlay. On the whole the factory co-operative stores are scarcely to be distinguished from the district co-operative societies, and if one can speak of 'welfare institutions,' it is of such as the workpeople carry on themselves with more or less assistance from the employers.

In any factory the workpeople may form a sickness insurance fund, whose rules must be approved by the Cantonal Government. This form of thrift is very popular amongst the working classes, and the employers, too, as a body, display much sympathy for it, often contributing substantial amounts to the funds, though the management is entirely or mainly in the hands of the workpeople. In some trades large insurance societies, embracing the whole body of workmen in the respective trades, have been formed, but there is none such in the cotton industry. In 1900 a sickness insurance fund was inaugurated in connection with the Appenzell Weavers' Union, but in 1902 it was changed into a general benevolent fund.

Usually when a member is ill, he receives the doctor's fee and a small daily sum in addition, but in some cases a larger daily sum is paid, and the patient pays his own doctor's bill. In the society attached to a typical cotton factory, where the doctor's fees are paid by the insurance fund, sick members receive in the case of men 1 franc and in that of women 70 cts per day for up to 40 days. In addition to the subscriptions of the members and contributions of the employers, the funds are also swelled by disciplinary fines, which employers are allowed to

¹ Thus on an average each workman spent £17 in the year at the stores. Many workpeople would be members of one family but among the purchasers were people not employed at these factories.

levy on condition that they apply them to purposes benefiting the operatives and not the firm ¹

There are a few old-age insurance funds and workmen's savings banks connected with factories. Thus at one large cotton mill with 600 workpeople, mostly females, there is a savings bank in which the operatives have deposits to the amount of nearly fr 320,000, and also an old-age pension fund ². Savings banks in connection with factories, however, are not so popular as are the sickness insurance funds. More popular with the working and peasant classes are the communal savings banks established in many districts, for example, two small neighbouring communes, in one of which there is a spinning mill and in the other a weaving factory, possess a joint communal savings bank in which over a million francs (*i.e.*, over £40,000) are deposited by workmen and peasants. Large sums are invested in the cantonal banks.

A Bill has been introduced into the Federal Legislature for the establishment of compulsory insurance against sickness and accidents. It is proposed to set up a "Swiss Accidents Insurance Office" to undertake accidents insurance, and to subsidise recognised institutions for the conduct of sickness insurance. It is not yet possible to forecast the final shape the measure will take.

¹ See p 98

² The accounts of factory sickness and benevolent funds are subject to examination by the factory inspectors

CHAPTER VIII

WAGES ¹SECTION I — *Spinning*

Wages are paid fortnightly, on Saturdays, and one week's wages are kept back by the employer. Mule minders and ring spinners are always paid by piece rates, piecers are sometimes paid by piece rate and sometimes by time rate, and in the former case they get a percentage of the spinners' wages, usually 60 per cent to 70 per cent. It is generally impossible to keep the English classification of big and little piecers in Swiss mills, owing to the difference in the length of the mules used, and the number of operatives employed per pair. Cardroom strippers and grinders are sometimes paid by piece rate but oftener by time, blowing room operatives always by time. There are no standard wages lists in Switzerland, as there are in Lancashire, but rates tend to be about the same, except in remote country districts, where they are lower than elsewhere. The following tabular statement of the wages paid in spinning mills in England and Switzerland shows the

¹ Particulars of wages have been obtained from employers who have in many cases courteously allowed me to inspect their wages books so that I have no doubt as to the accuracy of the information given to me, which has moreover been confirmed by conversations with foremen, with the Factory Inspector for the First District, and others. With regard to hand weavers' wages I have also availed myself of the annual reports of the Appenzell Weavers' Union whose president favoured me with an interview and much interesting information. I consulted the Secretary of the Workmen's Secretariate in Zurich but he possessed little reliable information as employers refused to give him the particulars he desired. However he kindly put at my disposal some information he had collected from operatives as to their wages, though as he did not think it accurate or exhaustive enough to publish himself, I have not quoted it in these pages. The figures given below are estimates based on the data supplied to me and not statistical averages. They probably do not give a less true picture on that account.

extent to which the latter falls short of our standard in this respect —

SWITZERLAND	—Francs per day—			Shillings per week.
	Min	Max	Average ¹	Average ¹
Mule spinners (men)	3 50	5 00	4 00—4 50	19/3—21/7
Piecers (women or boys)	2 00	3 00	2 50—2 70	12/-—13/-
Ring spinners (women)	2 00	3 60	3 00	14/5
Fly frame operatives (women)	2 50	3 50	3 00—3 50	14/5—16/10
Drawing frame operatives (women)	2 00	3 00	2 50—3 00	12/-—14/5
Cardroom grinders (men)	3 00	5 00	3 50	16/10
Cardroom strippers (men)	2 55	4 00	2 80—2 90	13/5—13/11
Blowing room operatives (men)	2 80	4 00	3 00	14/5

UNITED KINGDOM ²	Shillings per week Average
Mule spinners (men)	
Counts below 40s	38/6
Counts 40s—80s	42/10
Counts above 80s	46/-
Big Piecers (men and boys)	17/9
Little Piecers (boys)	11/11
Ring spinners (women)	15/
Fly frame operatives (women)	19/6
Drawing frame operatives (women)	19/6
Cardroom grinders (men)	29/3
Scutchers (men)	25/7
Mixers (men)	21/6

¹ Average is here used to mean general or prevalent.

² Quoted from the Board of Trade's Report on Earnings and Hours in the Textile Trades in 1908 (Cd 4545). These figures differ somewhat from those presented in the Report for December, 1909, of the International Federation of Textile Workers Associations. On the whole the latter figures are the higher.

The tendency* of wages in the spinning industry is upwards, and they have risen very considerably in the last twenty years, and somewhat in the last five years. Even now, however, they are lower than in most skilled trades in Switzerland, and the rise that is taking place is due to the increasing difficulty experienced in securing workpeople in face of the competition of industries in which wages are higher, especially the embroidering industry, in which when times are good a man on the Schiffli machine can earn 10 to 12 francs per day and on the hand machine 7 francs per day in the factory. In good times a hand machine embroiderer working at home can earn 10 francs a day, but this includes the wage of his wife or daughter who helps him at the work. But fluctuations in the amount of earnings are greater in the embroidering than in the spinning industry.

The following table shows the general level of wages in the years 1888 to 1891¹ —

Mule spinners (men)	13/10½ per week
Doffers and piecers (men)	8/7½ „ „
Doffers and piecers (women)	7/7½ „ „
Cardroom operatives (men)	10/9 „ „
Openers and Scutchers (men)	10/10½ „ „
Drawers and Derby doublers (women)	8/- „ „
Roving (fly frame) operatives (women)	9/9 „ „
Reelers, winders & doublers (women)	8/9 „ „

From this it appears that all wages have increased over 50 per cent in less than 20 years, except those of cardroom and blowing room operatives which have increased by about 33 per cent.

1 Compiled from "Die Arbeitslöhne in den industriellen Betrieben des ersten schweizerischen Inspektionskreises" by Dr. Schuler assisted by Dr. Wegmann. Quoted from 'Second Abstract of Foreign Labour Statistics (Board of Trade 1901)'. The average daily wages are given in the original but I have multiplied them by 6 so as to give the weekly wages. I have altered the grouping of the original, so as to bring all spinning wages together.

SECTION II — *Weaving*A — *Factory Workers*

In weaving factories as in spinning mills wages are generally paid by piece rates. Sizers are usually paid a day wage, but sometimes by piece rate, and tacklers though sometimes paid by the day, are usually paid according to the production of the looms under their charge, as in England.

There is considerable variety in the wages earned in this branch of the industry, due to the widely differing efficiency both of the operatives and the machinery. Rates tend to be fairly equal, though there are no standard lists except in the hand loom weaving industry of Appenzell.

The following tables show the wages earned in weaving factories here again Swiss wages are much lower than English —

SWITZERLAND			—Francs per day—		Shillings per week.	
			Min	Max	Average ¹	Average.
Winders (women) ²			2 00	3 30	2 50	12/0
Warpers	"		2 00	6 00	3 00—3 50	14/5—16/10
Sizers (men)			4 00	8 00	5 00—6 00	24/0—28/10
Drawing, reaching, and twisting (women)			2 00	$\left\{ \begin{array}{l} 3\ 50 \\ \text{Plain} \\ 4\ 50 \\ \text{Jacquard} \end{array} \right\}$		2 50—3 00 12/0—14/5
Plain weavings ³	2 looms		—	—	2 30	11/1
"	"	3 "	2 50	4 00	3 00	14/5
"	"	4 "	2 50	5 00	4 00	19/3
Muslin ⁴	"	2 "	2 50	3 50	3 00	14/5
"	"	3 "	2 90	5 00	4 00	19/3
					to 4 50	to 21/7
Coloured	"	2 "	2 00	5 00	3 00	14/5
"	"	3 "	3 00	5 00	3 50	16/10
"	"	4 "	3 50	6 00	4 50	21/7
Jacquard	"	2 "	2 50	—	3 50	16/10
"	"	3 "	—	5 00		

¹ Average is here used to mean general or prevalent

² Girl learners sometimes are paid fr 1 50 per day

³ 2 and 3 loom weavers are usually women or girls, 4 loom weavers are often men. Men and women are paid equal rates for the same work

⁴ Muslin looms are usually wide. On very wide looms a 2 loom weaver would earn as much as a 3 loom weaver on narrow or medium looms

Tacklers' wages are usually fr 5 to fr 6 per day, *i e*, 24/- to 28/10 per week, and those of loom oilers are usually fr 3 50 to fr 4 per day, *i e*, 16/ to 19/3 per week

UNITED KINGDOM	shillings per week Average
Winders (women and girls)	11/3—15/4
Warpers (women)	20/9
Sizers ² (men)	42/8—45/5
Drawing (men)	30/11
Twisting (men)	25/7
2 loom weavers (women and girls)	11/8—13/10
3 loom weavers (women and girls)	17/3—17/8
4 loom weavers (women and girls)	22/2—23/5
4 loom weavers (men)	24/11

Drawers-in must be assisted by boy reachers-in who earn perhaps 9/4 per week ³

It will be observed from the foregoing that women engaged in preparation work in Swiss weaving factories earn about as much as women engaged in preparation work in Swiss spinning mills. Both in spinning and manufacturing the difference between men's and women's wages is much greater in England than in Switzerland, except in the case of weavers, where there is not a great difference in either country.

The tendency of wages is upwards in the weaving as in the spinning industry, and the following figures quoted, slightly re-arranged, from the same source as the table relating to spinners' wages on p 91 will give some indication of the advance since the period 1888—1891

1 Quoted from the Board of Trade Report on Earnings and Hours in the Textile Trades in 1906 (Cd 4645) Cf p 80, n 2

2. The smaller amount is the average wage of the majority of sizers who are on time rates. The larger refers to those (about a quarter) on piece rates

3 This seems too high, but it is the Board of Trade figure

	Average wages per week
Foremen and overlookers	21/6
Men engaged in preparation and finishing and labourers	12/4½
Weavers, women (grey goods)	10/1½
Weavers, women (coloured goods)	9/1½

A comparison of the foremen's wages shown in this list with those of tacklers given on p 93, will show that there has been a rise of from 2/6 to 7/4 per week, while the wages of oilers show an increase of 4/5½ to 6/10½ per week over those of the miscellaneous men operatives

It is not indicated in the above list how many looms the weavers tended, but if their wages are compared with those of 3 loom grey cloth weavers and 2 loom coloured goods weavers at the present time, which are about 14/5 per week, an increase is shown of 4/3½ and 5/3½ per week respectively for grey and coloured cloth weavers, the proportionate increase being similar to that in the wages of female operatives in spinning mills

B — *Home Workers*

In this branch there is a standard wages list arranged jointly by the Association for Hand Weaving (employers) and the Appenzell Weavers' Union (operatives) ¹ The latter organisation succeeded in obtaining the recognition of a minimum list in 1900, in which the then existing rate for weaving staple articles was raised, and in 1902 the rate for weaving fancy goods of mixed silk and cotton or mercerised cotton yarn was raised. In the following year the Union opened negotiations for the raising of the rate for staple articles by 10 per cent, but was unable to obtain the advance. However, in 1906 a revised tariff was obtained which gave an

1 See p 106

increase of about 10 per cent in wages all round Prior to the formation of The Weavers' Union in 1899 wages had remained at the same level for several years, largely, no doubt, owing to the fact that the people could not very easily obtain employment in other industries But now the growth of the embroidering industry has made itself felt by employers of hand loom weavers, who find some of their best workpeople going over to embroidery This, together with the greater bargaining power given by association, has made possible the advances in wages obtained in recent years An important part of the work of the Hand Weavers' Union is to see that evasions of the wages list are not made by individual employers, and to take steps to exact redress from the employer in fault, if such evasions occur

The actual earnings of the hand weavers vary considerably, owing to the irregularity of their work The British Vice-Consul in St Gallen writes in the Report for 1907 on the Trade of Switzerland (No 4177 Annual Series) that weavers on hand looms earn from $1\frac{1}{2}$ to 4 francs per day, and this is a fairly accurate statement, but the weaver earning fr $1\frac{1}{2}$ would probably be a woman devoting only part of her time to weaving, and one earning fr 4 would most likely be a man devoting his whole time to the work The president of the Weavers' Union estimates that 25 cts an hour is rather above than below the average earnings, and as very long hours are worked, say 13 per day by men and 12 by women, the home weavers not being subject to the restrictions of the Factory Law, it appears that the average daily earnings of professional weavers are fr 3.25 for men and fr 3 for women Probably an average man weaver would earn somewhat more and an average woman weaver less than the above amounts Very good men weavers can earn as much as fr 5 per day on staple articles, and when times are good they earn on specialities from fr $4\frac{1}{2}$ to fr 6 per day If the wages

of the hand weavers are compared with those of the factory weavers, it is seen that while an average woman weaver earns fr 3 per day in the factory, a good woman hand weaver will hardly earn so much, though she works an hour a day longer. Moreover, there is more regularity in the work and wages of factory than of home weavers, and as the factories are subject to the supervision of the factory inspectors, the conditions under which the operatives work are generally superior to those of the Appenzell hand weavers.

CHAPTER IX

FACTORY LAW AND EMPLOYERS' LIABILITY ¹

IN 1871 the Canton of Glarus after many years of discussion enacted a comprehensive law for the regulation of labour in factories, and in 1877 the Swiss Federal Assembly passed the "Federal Act concerning Labour in Factories," which came into operation at the beginning of 1878 and is still in force ². This law, which follows the lines of the earlier Glarus enactment, regulates the conditions of factory work throughout the Confederacy. The Swiss Act is much more general in its terms than the English Factory and Workshop Act, 1901, which lays down very minute and rigid regulations, especially in regard to cotton factories. In Switzerland much more discretion is left to the Federal Executive and the Department of Industry in interpreting the general provisions of the Act. The Federal Council (Bundesrat) is both the national executive and, in matters not within the jurisdiction of the Federal Tribunal, also the final court of appeal. The interpretation of the Factory Act is specifically reserved to the Federal Council, which has from time to time issued special decrees and decisions on disputed points, which together with the text of the Act form the factory legislation of the country. An idea of the functions of the Federal Council in this connection may be given by saying that it combines the functions performed in

¹ See also Lloyd and Hobson, *The Swiss Democracy* ch. IX. and W. H. Dawson, *Social Switzerland*, ch. I.

² An "Expert Commission" was appointed in 1907 to recommend a revision of the Act, based on proposals of the Federal Factory Inspectorate. A Bill to be laid before the Legislature, is now in course of preparation by the Federal Council.

England by the Home Secretary when he issues special Orders under the Act of 1901, and by the Courts in giving decisions on questions arising out of the Act

The Swiss law bears a strong resemblance to the English, as regards provisions to ensure the health and safety of the operatives by means of ventilation, regulation of temperature, adequate sanitary conveniences, and the fencing of dangerous machinery, and also in the requirement of prompt notice in case of accidents. It is further provided that factories must be well lighted during working hours

There are no regulations in the Swiss Act, as there are in the English, governing self-acting mules and humidified factories, but the provisions for the fencing of machinery and the promotion of hygienic conditions enable the factory inspectors to insist on a standard of safety and of atmospheric purity in cotton factories, which probably does not fall short of that reached in England

The principal provisions of the Swiss law so far as it is applicable to cotton factories, besides those referred to above, are as follows —

I —General

Notice must be given to the Cantonal Government of the intention to build or alter a factory, and the factory inspector of the district must be consulted by the Government before it approves the building plans and internal arrangements

In every factory a set of Factory Rules must be prominently displayed, setting out fully the hours of work, the intervals allowed for meals, the time and method of paying wages, the notice required for the termination of employment, particulars of fines, which may in no case exceed half a day's wages and must be applied to the benefit of the workpeople, preferably in aid of the factory insurance fund, and generally all the

conditions of employment in the factory. The Rules cannot become operative without the approval of the Cantonal Government, which may not be granted before the workpeople have been consulted. No Rules can be approved which contain anything contrary to law. When approved the Rules are binding on both employers and employed, but if they work badly the Government may order their revision. Regulations not included in the Factory Rules are invalid.

The duty is imposed on employers of safeguarding morality and decency among the male and female operatives in the factory.

In the absence of a special written agreement to the contrary 14 days notice of the termination of employment must be given on either side, except in case of misconduct.

Wages must be paid in the factory and in legal tender, at least once a fortnight or by special agreement once a month. On the pay day not more than the last week's wages may be held back.

The duration of work may not exceed 11 hours on week-days and 9 hours¹ on Saturdays and days before holidays. In exceptional circumstances overtime may be worked, but only with the express permission of the authorities and for a strictly limited period. Even in such cases women and persons under the age of 18 may not be employed at night,² and men only with their free consent.

At least one hour's dinner interval must be allowed in the middle of the day for all the workpeople, and suitable accommodation must be provided for those who take their dinner in the factory.

In addition to Sundays each Cantonal Government may prescribe not more than eight days per year to be observed as holidays. The days prescribed are, as a

¹ By an Act of 1905.

² Night work means work between 8 p.m. and 6 a.m. (5 a.m. in June, July, and August).

rule, the Church holidays most generally kept in the respective cantons. It is not permissible to fine people for refusing to work on other Church holidays.

II — *Restrictions on the Employment of Women*

Women who have households to attend to must be allowed to leave work half-an-hour before the regular dinner interval, unless this is of the duration of at least an hour and a half.

Women may not be employed for two weeks before nor for six weeks after child-birth.

Women must not be employed to clean motors, mill gearing or other dangerous machinery while in motion.

III — *Restrictions on the Employment of Young Persons*

Children under 14 may not be employed.

For persons between the ages of 14 and 16 work in the factory must not be allowed to curtail the time allotted to education and religious instruction, and the total time spent in the factory, in education and in religious instruction, may not exceed 11 hours per day.

Attendance at continuation schools is compulsory in the important textile cantons of Aargau, Appenzell, Ausser-Rhoden and Inner-Rhoden, Glarus, St. Gallen and Thurgau, and is optional in Canton Zurich.

Persons under the age of 16 may not be employed to clean or tend motors, engines, electrical machinery and mill gearing, nor to clean any dangerous machinery while in motion.

Several of the above provisions invite comment, especially those relating to Factory Rules, the hours of work, and the protection of women and young persons.

By means of the Factory Rules the relations between employer and employed are set on a legal basis, and the risk of misunderstanding or unfair dealing is much

diminished In Germany Factory Rules of a character similar to the Swiss are required by law,¹ but there is no provision in England for anything of such a comprehensive nature, though an Abstract of the Factory Act and notices as to certain matters specified therein must be posted in all factories²

The provisions regulating hours of work and holidays apply not merely to women and young persons, as in England, but also to adult men This is not, however, of great practical importance in cotton factories, as it is not as a rule convenient to keep the machinery running in the absence of the women operatives Consequently the week of $55\frac{1}{2}$ hours, which is the legal maximum in England for women and young persons, prevails with few exceptions throughout the cotton industry This compares advantageously with the 64 hours' week allowed in Switzerland, even though allowance be made for the fact that machinery runs quicker and the operatives work at higher pressure in England

There is a strong movement in Switzerland in favour of shorter hours, and the Factory Inspectorate has proposed the introduction of a maximum legal day of 10 hours Already some firms have granted the 10 hours' day, and one firm of cotton manufacturers allows the Saturday half-holiday as in England, though the majority of cotton factories still work the full legal maximum In some industries the probable change in the law has been more generally anticipated, notably the engineering industry, in which the 10 hours normal day and Saturday half-holiday are already usual

The close time prescribed for women in case of childbirth is double that required in England, but as regards

1 See Shadwell, *Industrial Efficiency* 'ch V

2. Rates of wages need not appear in the Swiss Factory Rules but they must be displayed in all English factories where wages are paid by the piece

the two weeks prior to confinement the law is little observed, as most women wish to continue earning as long as possible, and its enforcement in these circumstances is very difficult

In the provisions governing the employment of the young Switzerland is strikingly in advance of England, where children may be employed at the age of 12. Swiss factory workers between the ages of 14 and 16 are protected by the law in a somewhat similar way to English half-timers between 12 and 14 years of age, though not to the same extent, and employers have to make arrangements, whether by means of a shift system or otherwise, whereby such persons can be spared from the factory during the hours required for education. The protection accorded to young persons over 14 is much less complete in England, but it extends to persons up to 18 years of age instead of 16 as in Switzerland.

By an Act of 1881, which took the place of a section of the Factory Act of 1877, Swiss employers are liable for damage and loss occasioned to workpeople by accidents befalling them in the course of their employment, unless the accident was entirely due to *force majeure* or to the workman's own fault. In cases of contributory negligence on the workman's part the amount of compensation may be reduced¹. The maximum amount of compensation that may be awarded is fr 6,000 (£240). The employer may insure his workpeople and so cover himself in case of accident. If he insures them against all accidents occurring in the course of the employment, he may, with their consent but not otherwise, deduct an amount not exceeding half the premiums from their wages. Many employers have insured, and in some cases the workpeople have agreed to pay a part of the premiums in order to avoid the risk

¹ This is entirely different from the English law under the Act of 1906

of the employer's inability (*e g* , in case of bankruptcy) to pay the compensation in case of accident. Groups of employers have occasionally combined to form a joint insurance fund, but it is much more usual to insure with Swiss or foreign insurance companies, though complaints are made of the high premiums charged. The Factory Inspector for the First District mentions in one of his reports that there is a fairly general feeling that the practical compulsion on small employers, who might be crippled by having to pay compensation for a series of accidents, to insure their workpeople, puts it in the power of the companies to charge extortionate premiums, and he urges on this and other grounds the desirability of a national system of insurance. Proposals to establish a system of state insurance are at present under consideration by the Federal Legislature.¹

¹ Cf p 87

CHAPTER X

TRADE ORGANISATIONS

SECTION I—*Trade Unions*

Trade unionism has made but little progress in the Swiss cotton industry, and its influence is very slight. There is a General Federation of Swiss Textile Operatives to which the local societies are affiliated. At the end of 1906 the particulars and membership of the affiliated societies were as follows —

	Male	Female	Total.
1 Union of Silk Purse Cloth Weavers	1146	92	1238
2 Appenzell Weavers' Union	1209	1146	2355
3 'East Swiss Textile Workers' Union	307	183	490
4 Swiss Hand Machine Embroiderers' Union	1000	10	1010
5 Swiss Sizers' Union	60	—	60
6 Zurich Textile Workers' Union	1038	877	1915
7 Union of Swiss Embroidery Operatives	749	—	749
	<hr/> 5509	<hr/> 2308	<hr/> 7817

Of the above Nos 2, 3 and 5 consist of cotton operatives, and No 6 is composed of silk and cotton operatives, the embroidery workers are chiefly engaged on cotton goods but do not, of course, belong to the cotton industry proper. Nos 1, 2 and 4 are unions of home workers, and Nos 3, 5, 6 and 7 are unions of factory operatives. It will be observed that the membership of the home workers' unions greatly exceeds that of the unions of factory workers. In the past two or

three years there has been a considerable increase all round, and there are now over 10,000 organised textile operatives, but these represent only about 6 per cent of those employed in the textile industries.

The organisation of the General Federation of Textile Operatives is very loose, each union maintaining a high degree of independence, and indeed the local branches of the individual unions show no great degree of cohesion with one another. For any special purpose such as a strike, though strikes are rare in the cotton industry, the branches may combine, but normally there is little co-operation between operatives of different districts. The only cotton union that has made its influence felt, or that has materially affected the social position of its members is that of the Appenzell hand weavers, whose activities in obtaining a standard rate of wages and in forming a benevolent fund have already been mentioned.¹

The General Federation of Textile Operatives is affiliated to the Federation of Trade Unions (Gewerkschaftsbund), which includes a majority of the unions in the country but does not wield any great influence. Originally its constitution proclaimed adhesion to the socialist programme, but since 1900 it has declared and maintained strict neutrality in politics. Nevertheless there is no doubt that the majority of its members are socialists, though it includes several unions, for example, the Appenzell Weavers' Union, which are quite free from any socialistic bias.

A far more comprehensive and influential organisation is the Workmen's Federation and Workmen's Secretariate, which possess a unique and remarkable character. Any association devoted to the interests of labour may join the Federation, and the affiliated bodies include

¹ See p. 86 and pp. 94-95. Some advance has been made latterly in the organisation of the General Textile Federation. See Report of the International Federation of Textile Workers Associations, April 1910.

sickness insurance societies (with 90,000 out of the Federation's total membership, in 1905, of 210,000), socialist and general working men's societies, and Catholic working men's societies. The Federation of Trade Unions is affiliated, as are also the leading organisations of individual industries, including the textile trades. Affiliated societies are free to carry on their own work and propaganda in their own way.

Every three years the Workmen's Federation holds a Congress at which the Council and the Workmen's Secretary are elected. Representatives of the Swiss Department of Industry attend the meetings of the Congress and of the Council, and the State pays an annual subvention towards the maintenance of the Secretariate. The duties of the Secretary include the conduct of economic investigations and enquiries into the operation of social legislation, in which connection his advice and assistance are often invoked by workers' associations and individual working men. His position is a curious, but successful, combination of that of a labour leader and a state official.¹

The comparative failure of trade unionism to make headway in Switzerland—and the textile trade is typical of all the leading industries in this respect—is due to complex causes. The Workmen's Secretary ascribes it to fear of the masters, and certainly the textile employers are strongly organised, but the relations between masters and men in the cotton industry have as a rule been very good, and though the masters do not like the unions, there is no evidence that their members suffer in any way. Except in slack times the factory owners have difficulty in securing an adequate supply of labour and so are not in a position to be harsh. This is one

¹ For an account of the foundation and constitution of the Workmen's Federation and Secretariate see W. H. Dawson, *Social Switzerland* ch. iv.

reason why Swiss operatives have not felt it necessary to combine ¹

SECTION II — *Employers' Associations*

The employers in the cotton industry possess a strong organisation in the Spinners', Doublers' and Manufacturers' Association, which comprises nearly all the spinning and manufacturing firms in the country and also several doubling firms. There are also similar but smaller associations of employers in special branches of the cotton and kindred industries. Such are the Coloured Goods Manufacturers' Association, the East Swiss Doublers' Association, the Calico Printers' Association, the Hand Weaving Employers' Association, and the East Swiss Finishers' Association. The objects of all these bodies are to safeguard the interests of the industry as a whole, for example, by representing to the Government the views of the industry on such matters as factory or other legislation affecting trade interests, the negotiation of treaties of commerce, alterations in the tariff, and so forth. They also form a means for enabling employers to take concerted action on the question of short time and in matters affecting the relations between employers and workpeople. The Spinners' and Manufacturers' Association appoints a representative on the Bremen Cotton Exchange to look after Swiss interests, and represents Switzerland on the International Federation of Master Cotton Spinners' and Manufacturers' Associations. In character and functions it resembles the English Master Cotton Spinners' Federation, but it includes manufacturers. The Coloured Goods Manufacturers' Association has taken steps to regulate sale prices, so as to avoid undue competition, and in 1907 certain increases on the prices current the year before were arranged. However, members are not bound to

¹ Cf. Lloyd and Hobson 'The Swiss Democracy,' ch. xlii for a discussion of the attitude of the Swiss people towards Socialism and the Labour Movement.

notify the Association of their sales, so it seems that there are no means of enforcing such arrangements. A few years ago the East Swiss Doublers' Association made a price agreement of a much more complete and far-reaching character, but the arrangement speedily collapsed. Firms were willing to charge the agreed prices so long as trade was good, but when orders became scarce the desire to obtain business by under-quoting their competitors was too much for their loyalty. In times of bad trade the spinners have agreed on prices below which they would not sell, but any arrangement of this kind has been voluntary and temporary. On the whole nothing so definite as a Kartell can be said to exist in the Swiss cotton trade. The East Swiss Finishers' Association has a regular tariff of charges, but as finishing firms charge for work done and do not sell goods, their position is rather different from that of firms in other branches of the industry. Similar agreements among dyers and finishers are not unknown in England. Amalgamations such as the Calico Printers' Association or the Bradford Dyers' Association do not exist in Switzerland.

Among the various objects of these associations that of resisting strikes is not included. In 1905 the Spinners', Doublers' and Manufacturers' Association appointed a sub-committee to consider the question of an employers' combination to resist unjust claims on the part of the workpeople, and invitations were sent to the other employers' associations in the textile industries to take part in formulating a scheme. As a result the Association of Employers in the Textile Industry, comprising a large majority of the firms engaged in its different branches, was formed to provide for concerted action in industrial disputes. In case of a strike at the factory of a member the Association enquires into the circumstances, and if it considers the employer in the right, it takes up the dispute on his behalf, indemnify-

ing him against loss, but compelling him to leave himself entirely in the hands of the Association with regard to the settlement of the dispute. The Association has drafted a "strike clause" for the members to insert in their contracts. An Association with similar objects was formed in 1909 by the Schiffli Machine Embroidery Manufacturers.

It will be seen from the above sketch that the principle of combination has made far greater headway among the masters than among the operatives, for whereas the former have formed associations comparable in power and extent with the masters' associations in England, relatively of course to the size of the industry in the two countries, the workpeople possess nothing that can be compared with the mighty trade union organisation in the Lancashire cotton industry.

PART II
VORARLBERG

NOTE —Vorarlberg is the most western division of the Austrian Empire. It is bounded on the west by Switzerland and on the east by the Tyrol, with which latter it is united for administrative purposes, though it enjoys its own constitution and provincial diet.

CHAPTER XI

THE INDUSTRY AND TRADE IN VORARLBERG AND THE
TYROLSECTION I—*Origin and Magnitude*

The cotton industry was introduced into Vorarlberg about 1770. At first raw cotton was obtained from Switzerland, and the yarn was returned to be woven in that country. Somewhat later hand weaving was introduced, and by the beginning of the 19th century not only spinning and weaving, but also bleaching, dyeing and finishing were carried on. Soon after, block printing was established as an important industry, and in 1813 the first mechanical spinning mill was built. The following year saw the beginning of the manufacture of coloured woven fabrics, and in 1830 the first power looms were installed. The first roller printing machine was set up in 1879. Vorarlberg was thus among the first countries in which the English mechanical inventions were adopted. The contiguous situation of Vorarlberg and Switzerland rendered it natural that there should be interchange of ideas and close commercial relationship between them, and the cotton industry was introduced from Switzerland to Vorarlberg in much the same way as the embroidery industry was. But in the case of the cotton industry Vorarlberg soon became independent of Switzerland and developed on her own lines. The possession of abundant water power enabled both of them to attain a pre-eminent position in the cotton industry among Continental countries in the first half of the 19th century, but the growing efficiency and importance of steam power in the second half of the

century caused the absence of coal-fields to be severely felt

The factories extend from Bregenz on the Lake of Constance throughout the string of townlets and villages that line the Austrian side of the Rhine Valley as far as Feldkirch, and are most closely concentrated in the small town of Dornbirn, which bears an essentially industrial character. There are also factories in Bludenz at the foot of the Alps, and in the small neighbouring principality of Liechtenstein there are some spinning and weaving factories owned by Swiss and Vorarlberg houses

There are 12 firms, all private, engaged in the cotton industry in Vorarlberg, which may be classified as follows —

Spinning and manufacturing	7 ⁽¹⁾
Spinning, manufacturing and printing	1
Manufacturing and printing	2
Manufacturing (grey cloth)	2

(¹) 3 grey cloth

3 coloured goods

1 coloured goods and grey cloth, also raising and bleaching

The number of individual spinning mills is 11 with about 250,000 spindles, and of weaving factories 13 with about 4,000 looms

All but one of the coloured goods firms dye their yarn, mostly in the hank, and two sell dyed yarn and dye for other parties. They all finish their own cloth. Those who use doubled yarn have their own doubling plant, and there are also a few thousand doubling spindles in spinning mills producing for sale. There is a firm of bleachers, dyers and finishers, who dye and bleach linings and shirtings, and bleach and finish embroideries in the Swiss style, and there is a firm that manufactures and prints silk and cotton goods, principally the former

The number of cotton factories in the Tyrol, nearly all in North Tyrol, more than half of which belong to Vorarlberg firms, is as follows —

9 spinning mills ⁽¹⁾	with about 180,000 spindles
8 grey cloth factories ⁽²⁾	} with about 2,800 looms
2 coloured goods factories	

⁽¹⁾ 8 with weaving factories attached

⁽²⁾ All attached to spinning mills

The scale on which the industry is carried on is very small. Integration is carried much further than in Switzerland, differentiation being rendered impracticable by the small size of the industry. No new factories have been built since 1894, but additions have been made to several of those already in existence.

SECTION II — *Power, Equipment and Working of Spinning and Weaving Factories and Printworks*

Water turbine driving is very prevalent, and within the last few years the conversion of water into electric power for driving has become fairly common. Some firms generate their own electric power and others obtain it from central power stations. Steam engines are also used, especially as a reserve for the dry season, but owing to the high cost of coal they are now giving place to electricity. The cost of electric driving is from £4 per H P per annum upwards.

The water turbine installations and steam engines are all of Austrian make, as is also most of the electrical machinery, though some of the latter is Swiss. In style and equipment the spinning mills and weaving factories of Vorarlberg and the Tyrol resemble those of Switzerland, but the proportion of ring spindles to mule spindles is much greater. Most of the machinery is English, but a fair number of Swiss looms, mules and ring frames are in use, as well as some German and Austrian looms for fancy coloured goods. The more modern factories

are humidified, the most usual method being the injection into the rooms of air moistened by being pumped through water. In weaving factories, that are not humidified, the weft is sometimes damped.

The speed at which the machinery is run is much the same as in Switzerland, and the production obtained is similar, though there is a great difference between the best and the worst equipped mills. In one of the most modern and efficient spinning mills the average production per spindle in 11 hours is 8.3 hanks of yarn count 28.7 on rings and 6.67 hanks count 26.8 on mules. This is good, being about equal to the production in an English mill, but it is quite exceptional for Vorarlberg. The reverse side of the medal is shown in another mill with very antiquated machinery, in which the average production per spindle in 11 hours is 4.49 hanks count 28.24 on mules, and 5.66 hanks count 33.57 on ring frames. The production of these counts in an English mill would be 5.4 hanks and 7.5 hanks respectively in 10 hours. In weaving factories the effective production obtained on plain goods is about 80 per cent. to 85 per cent. and on coloured goods about 60 per cent.

The calico printing industry of Vorarlberg is of considerable importance. The number of roller printing machines is 23, of which 3 or 4 are English and the rest German, and there are 11 perrotine machines. A considerable amount of raising is done, for which there are over a dozen machines, all of German make. Among the roller printing machines are two twelve-colour reversibles and one machine three metres wide, which is said to be the largest on the Continent. There are one printer and two to four assistants to each roller machine according to the class of work, and as a rule one printer to every two perrotine machines.

Two of the three printworks produce high class and expensive articles, while the third devotes itself to cheap goods for the masses. All attain a high production,

5,000 m per machine per day of 11 hours being about the average. The variety of designs is very great, one firm alone engraving between 1000 and 1200 rollers per year, both pentagraph and hand engraving are employed. Two of the works are driven by steam and the third by electricity, which is generated by means of a steam engine. In this works each printing machine is driven by a separate motor.

In two of the works block printers are employed on specialities, particularly table centres and tray-cloths of elaborate and often highly artistic designs, some of them copied from patterns in the British Museum and the Louvre. The production of a block printer is 14 or 15 m per day.

SECTION III — *Product and Marketing*

The yarns spun are of low and medium counts. From 3s to 12s are spun from waste and Indian cotton, and from 12s to 44s from American cotton, Egyptian being also used for 40s to 44s. One firm spins up to 60s from Egyptian cotton. Most of the yarn produced is consumed in the local weaving factories, but a good deal of both single and doubled yarn is sold to Hungary and different parts of Austria. Spinners sell direct to manufacturers within the empire, but the small export trade in yarn, mostly with the Balkans, is done through shipping firms in Trieste.

The coloured goods factories use principally yarns within the limits of the counts spun locally, but doubled yarns up to 120/2 are also used. These are obtained from England and Switzerland. The plain cloth factories produce printing and bleaching cloths for the local calico printing industry and for sale to Viennese houses, which generally have them finished in Bohemia. None of the calico printing firms makes enough material for its requirements, so they are obliged to buy cloth. Besides the large quantity obtained from the local

makers much is bought from Bohemia, Germany and Switzerland. The duty on cloth imported to be printed and re-exported is remitted.

The calico printers and coloured goods manufacturers are also merchants and keep warehouses in Vienna, where the sales department of the business is carried on, and most of them have agents in home and foreign centres. The plain cloth manufacturers, on the other hand, warehouse their goods in the factory and have no establishment in Vienna. They sell either to wholesale houses or direct to calico printers.

The variety of fancy woven and printed cloths produced is very great, and they are often of considerable beauty. The application of art to industry is probably more advanced at the present time in Vienna than in any other part of Europe, and there is a school of excellent designers and draughtsmen, whose artistic taste and skill find expression in textile and other wares. The Vorarlberg industry avails itself freely of this talent, employing some of the best designers in Austria, and hence it has obtained a high reputation for certain classes of fancy goods.

In the finer classes of printed dress goods and in printed table centres and tray-cloths a fair export trade is done with France, England, the United States, and other countries. The bulk of the trade in the cheaper qualities of dress prints, mostly indigo blue discharges, and in printed flannelettes, cretonnes and bed covers, usually of bold design and bright colours, is with the different parts of Austria and Hungary, particularly the latter, but some trade is done with the Balkans, Egypt and Syria.

The best classes of fancy woven dress goods are for the home trade, and for export to Roumania, Germany and Switzerland. Cheaper coloured dress stuffs and bed-covers, bleached and coloured table cloths, and bleached flannelettes are sold to different parts of the

empire and exported to the Levant. Some trade in bright striped umbrella cloths is done with Bosnia and Croatia.

Formerly a considerable trade was done with Lombardy and Venetia, and most of the Vorarlberg firms had branches or agents at Verona. But after the loss of the Italian provinces this trade came to an end. The branches at Verona had to be closed, and the Vorarlberg manufacturers were compelled to seek other markets, principally within the empire.

SECTION IV — *Labour*

As regards labour, the general economic condition of Vorarlberg is similar to that of Switzerland. Many of the workpeople belong to peasant families, but there is also a considerable operative class in the cotton centres. Latterly the growth of the embroidering industry has caused a shortage in the local supply of labour, and consequently many foreign operatives are employed. Most of them are German-speaking people from South Germany, the Teutonic districts of Bohemia, and North Tyrol, and there are also many Italian-speaking people, mostly from South Tyrol, but also from Italy. The Tyrolese are mostly peasant proprietors who being unable to make enough out of their small holdings, shut up their cottages and go forth to find work in the Vorarlberg factories¹. When they have saved a sufficient amount they return to their homes. Relatively to the size and population of the country the industry of the Tyrol is much smaller than that of Vorarlberg, and there is no difficulty in getting an adequate local supply of labour.

The number of operatives employed in spinning mills is similar to that employed in Swiss mills doing the same class of work, but as the counts spun in Vorarl-

¹ Although there are employment registries in connection with the Relief Stations there is much tramping from factory to factory in search of work on the part of the immigrants.

berg are much coarser on the average than those spun in Switzerland, and as a far smaller proportion of Egyptian cotton is used, the average number of workpeople employed is greater, being about 7 or 8 per 1000 spindles, and rising in some mills where coarse yarns are spun on ring frames to upwards of 10 operatives per 1000 spindles. All the mills do a great deal of reeling, which adds to the number of people required. In most of the preparatory operations the number of workpeople per machine is as a rule practically the same as in Switzerland, but on the mules there are almost always more operatives in Vorarlberg, and unlike Switzerland women are not employed as piecers. In mills spinning 16s to 40s yarn there would be on mules of 900 spindles spinning twist, 1 minder, 2 piecers and 1 creeler per pair, and on mules of 900 to 1000 spindles on weft, 1 minder, 2 or 3 piecers and 2 creelers per pair. In a mill where yarn from 4s to 24s is spun there are 1 minder, 2 piecers and 3 creelers per pair of mules of 500—700 spindles each.

In weaving factories the proportion of labour to machinery is practically the same as in Switzerland, there being generally 3 or 4 plain looms and 2 or 3 coloured looms per weaver. For wide Jacquard looms (180 cm) there is usually one man per loom.

The standard of living in Vorarlberg is the same as in the neighbouring cantons of Switzerland, and there is not much difference on the whole in the prices of foodstuffs. Meat is not much eaten, but plentiful quantities of grain, milk, cheese, butter and lard are consumed.

The following list shows the average prices of some of the most important foodstuffs in the four Vorarlberg towns in 1905, and also those ruling in Feldkirch in 1907¹

¹ I am indebted for these prices to the Secretary of the Chamber of Commerce for Vorarlberg in Feldkirch.

IN VORARLBERG

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Article.		BLUDENZ	BREGENZ	DORNBERN	FELDKIRCH.	
		1905	1905	1905	1905	1907
	Per	Kronen ¹	Kronen	Kronen	Kronen	Kronen
Polenta	kilo	0 28	0 30	0 26	0 30	0 36
Rice	kilo	0 56	0 48	0 40	0 64	0 60—0 68
Butter	kilo	2 30	2 40	2 40	2 40	2 60
Margarine	kilo	1 70	1 80	1 68	1 70	1 40—1 90
Bread						
Wheaten	kilo	0 38	0 38	0 36	0 38	0 40
Rye	kilo	0 31	0 36	0 30	0 34	0 36
Eggs	dozen	0 84	0 96	0 84	0 84	0 84
Potatoes	kilo	0 16	0 26	—	0 12	0 10—0 20
Beef						
First						
quality	kilo	1 80	2 00	2 00	1 80—2 00	2 00—2 20
Lowest						
quality	kilo	1 00	1 60	1 20	1 00	1 00

Clothing is more expensive in Vorarlberg than in Switzerland, and it is common for children to go about without shoes and stockings, though this is due to custom more than to poverty

In most parts of Vorarlberg the rent of dwellings with a kitchen and two rooms is 3/- a week, and of dwellings with a kitchen and four rooms between 5/- and 5/6 a week. As a rule neither gas nor electric light is laid on, and the inhabitants use oil lamps. In one or two villages there is insufficient housing accommodation, and the manufacturers have therefore built houses for their workpeople which they let to them at very moderate rents, lower in fact than in Switzerland, but the accommodation is inferior. The rents shown in the following table are typical —

Dwelling with kitchen and one large room	1/3 a week
Dwelling with kitchen and two rooms	1/8 „
Dwelling with kitchen and two large rooms	2/1 „
Ditto with electric light	2/6 „
Dwelling with kitchen and three rooms	2/1 „
Ditto with electric light	2/9 „

¹ 1 Krone=100 Heller=10 pence. The Austrian Krone (crown)=
²/d more than the franc. For kilo see p. xv

One spinning firm keeps a boarding-house for its workpeople, the charge for board and lodging being seven pence a day, and a firm of calico printers provides 100 dwellings for its workpeople rent free

It is reckoned that the normal expenditure of a Vorarlberg workman on board and lodging is 1/3 a day, and of a man and wife together 1/9. The cost of living in the Tyrol is, with the exception of Innsbruck, rather less

There are slight differences in the rates of wages paid in different parts of Vorarlberg, but on the whole the general level is not much different from that of Switzerland, though male operatives are paid rather more and female operatives rather less in Vorarlberg than in Swiss spinning mills. In weaving factories there is little difference except that sizers are paid 20/- to 25/- a week in Vorarlberg against 24/- to 28/10 in Switzerland. Wages are lower in the Tyrol than in Vorarlberg, especially those of male operatives in spinning mills

Wages in the calico printing industry are as follows —

	Per day
Roller printers (inferior work)	4/2—5/-
Roller printers (superior work)	7/-—8/
Perrotine printers	3/2
Hand printers	6/-—8/-
Other workmen	2/8—3/-

The hours of work are ten a day in Dornbirn and Innsbruck, by agreement between the employers and the workpeople in those towns. In other parts of Vorarlberg and the Tyrol eleven hours a day are worked. There are in Vorarlberg branches both of the Social Democratic and Christian Socialist textile workers' trade unions, between which there is a good deal of rivalry.

The cotton trade employers belong to the local branches of the Federation of Austrian Manufacturers

and of the Austrian Employers' Association, both of which have their headquarters in Vienna. The object of the former is to protect the interests of manufacturers in all matters in which they might be affected by the action of the government, that of the latter to defend the interests of the employers in case of conflicts with labour ¹

All the spinning firms also belong to the Austrian Spinners' Association, whose members are obliged to report all yarn sales, with the prices, to the central office for circulation among each other, and which has recently established a price arrangement. An attempt was made to introduce a similar plan among manufacturers, but in their case it proved unsuccessful ²

1 For information regarding trade unions and the State system of compulsory insurance against accidents and against sickness in Austria which resembles that of Germany see the Third Abstract of Foreign Labor Statistics (Cd 3120) published by the Board of Trade in 1906. A fuller account of the German system of insurance is contained in Shadwell's 'Industrial Efficiency' ch. ix and Brassey and Chapman's 'Work and Wages, Part II' ch. vi. An account of some branches of Austrian trade union activity will be found in Schlosser's 'Report to the Board of Trade on Unemployment in Foreign Countries (1904)'.

2. An attempt was made in the Manchester cloth market in 1899 to collect and publish a record of sales but it proved a failure. No such attempt has been made in the Manchester yarn market. Cf. Chapman 'The Lancashire Cotton Industry' p. 134.

PART III

ITALY

CHAPTER XII

GROWTH, CHARACTER AND LOCALISATION OF THE
INDUSTRY

COTTON was an article of commerce in Italy long before its introduction into England. In the 13th and 14th centuries Milan and Florence, Venice and Genoa were important markets from which raw cotton was distributed to the workers of the Netherlands, who subsequently introduced the industry into Lancashire. In early times there was some cotton manufacturing in Venice, and mention is made of fustian weaving in Milan in the 14th century. However, the industry never attained to any importance, and at the beginning of the 19th century there was practically no spinning in Italy, and weaving was carried on as a cottage industry for the supply of purely local wants. During the first half of the 19th century there was some development of the spinning industry in Northern Italy, but this was hindered in Lombardy and Venetia during the period of Austrian domination by the free importation of yarn from Austria, largely from the old-established industry of Vorarlberg. In 1868 the number of spinning and doubling spindles in Italy was 450,000, and the government statistics of 1876 showed a total of 764,862 spindles. As this increase in spindleage was not commensurate with the increase in consumption, the Government with the purpose of stimulating the industry imposed a new tariff in 1878. However, this did not cause the industry to develop sufficiently to make Italy appreciably less dependent on imported cottons, and accordingly in 1887 a highly protective tariff was imposed, under which

the industry has made a rapid and continuous advance, some indication of which is given by the following figures¹ —

	Years	IMPORTS (In Quintals)		EXPORTS (In Quintals)	
		Yarn	Fabrics	Yarn	Fabrics
Old Tariffs	{ 1875	119,414	126,707	283	1,873
	{ 1885	76,823	127,244	992	2,826
New Tariffs	{ 1895	13,615	36,022	10,852	49,668
	{ 1905	8,258 ²	29,612	100,331	248,933

In an article written in 1906, Baron Cantoni, President of the Italian Cotton Association, estimated that 23 per cent of the cotton manufactures of Italy were exported and the remaining 77 per cent consumed in the country

Under the protective system Italy has changed from an importing to an exporting country, and this has naturally meant a great increase in the number of spindles and looms. In 1903 there were, according to official statistics published in 1906, 1,693,863 spinning spindles and 240,000 doubling spindles, but these figures are considered by competent persons to have been an under-estimate. In 1908 the Cotton Association of Italy published a Directory which showed a total number of 3,968,700 spindles for 1907, and in the statistics of the International Federation of Master Cotton Spinners' and Manufacturers' Associations, published in March, 1909, the number of spinning spindles in work in Italy was estimated at 4,000,000³. The number actually returned to the International Federation was 3,587,405, of which 1,011,926 were mule

¹ Particulars relating to Italian imports and exports of cotton and cotton goods are derived from the official Customs Statistics (*statistiche doganali*) issued annually

² 3772 quintals sewings.
4486 quintals other

³ In the "Cometlboro Handbook, published in September, 1909, the number of spindles is given as 4 500 000

spindles and 2,575,479 ring spindles. In addition 184,732 spinning spindles were actually returned as in course of construction, and the true number is doubtless greater. Together with the growth of spinning there has been a corresponding growth of doubling, and the last few years have seen a noteworthy increase in plant for the production of sewing cottons.

There has been a similar growth in the manufacturing branch of the industry, though owing to the greater number of weaving factories, and the fact that weaving concerns are often comparatively small, it is less easy than in the case of spinning to get figures that would serve accurately to measure the development, the various statistics and estimates being very conflicting. In 1868 there were 86,000 hand looms, mostly distributed amongst the weavers' cottages, but no power looms, in 1876 there were 13,517 power looms. In 1900 the number of power looms, as given in the government statistics, was 60,722, but this is certainly an underestimate, and in an article in the *Annual of the Italian Textile Industries* (Milan, 1906) the number of power looms in 1900 is stated to have been 100,000, while the number in 1905 is estimated at between 120,000 and 130,000. The *Directory of the Italian Cotton Association* gives the number of power looms in 1907 as 122,150, but this appears to be only the number actually reported by manufacturers to the Association, so it is possible that the actual number is greater, and the estimate of 130,000 is probably not too high.

With regard to hand looms it appears from the government statistics that in 1900 there were 14,267 in factories weaving grey and coloured goods, and 13,807 in 1903, of which 4,206 were on grey goods and 9,601 on coloured goods¹. Most of these looms were engaged on fancy articles, including tapestries. There has

¹ Many of these looms, though belonging to the manufacturers are in the weavers' homes. cf. chap. xiv. sect. III.

probably not been much change since 1903 with regard to these fancy looms. As regards hand looms employed in domestic weaving the official statistics for 1903 give the number as 60,025, but it is stated that this includes many old looms no longer in use. The Cotton Directory estimates the number actually in work in 1907 at about 25,000.

The number of factories of all kinds in which cotton is treated was 997 in 1907, many small weaving factories, doubling mills, bleachworks and dyeworks being included in this number, and some of the old spinning mills are also very small. But the bulk of the spindles and a large proportion of the looms are contained in large modern spinning mills and weaving sheds. It is very common for one firm to own both spinning and weaving factories, especially in the case of grey cloth manufacturers. Many firms own also bleachworks and dyeworks, and most of the calico printing firms possess their own spinning and weaving factories, though they also often buy cloth to print. Some of the larger concerns are limited companies, which own several spinning mills and weaving sheds, as well as printworks, dyeworks and bleachworks. Spinners and coloured goods manufacturers frequently possess doubling departments. Differentiation of functions is thus carried by no means so far as in Lancashire or even Switzerland, indeed the tendency is all in the direction of integration except in the case of coloured goods manufacturers. But although differentiation is not the rule as regards firms, differentiation as regards factories is often carried very far, many companies owning spinning mills in the country and weaving sheds and bleachworks or dyeworks in industrial centres.

The usual size of a spinning mill is from 30,000 to 60,000 spindles, and the typical Italian mill is one of 50,000 or 60,000 spindles. Some firms own many more, but in such cases they are usually distributed in two or

more mills. It is not usual to build mills with less than 25,000 spindles, though some old smaller mills are still in work, many of which belong to large concerns that have bought them up.

The size of a first-rate weaving factory (most of them being sheds) ranges from 400 or 500 up to 2,000 looms, but there are also many much smaller concerns. The number of looms in a typical coloured goods shed is about 500, but in a plain cloth shed the number is about 800 to 1,000. Many concerns began in a small way, so that often the looms are found to be divided between two adjacent buildings, one old and one new.

A very important part in the development of the Italian industry has been played by Swiss. Formerly Italy was one of Switzerland's best customers for cotton goods, but when the high Italian tariff was imposed it became difficult for the Swiss firms to sell their product in Italy. Therefore, in order to get over the tariff wall many Swiss built factories in Italy, where they found a plentiful and cheap, though not very efficient, supply of labour. Some of these factories were erected by firms already established in Switzerland, but more often entirely new firms were founded. Most of the concerns were small in the beginning, but as they prospered extensions were made, and many are now great undertakings. Most of these Swiss firms are in the districts of Bergamo and Turin. Many of the present members are young men who have been brought up in Italy and are Italian in feeling, but many retain a great deal of national exclusiveness. All the most recently established factories owe their origin to Italians and Italian capital, and as time goes on the proportion of the Swiss element grows gradually less, though it is still important.

Many of the new factories of all kinds have been founded by limited companies, as have most of the new Lancashire spinning mills, but the financial position of

the Italian concerns is on the whole stronger, as share capital is easily raised if the names at the head of the company are good, and hence the necessity of carrying on the business on borrowed capital, which tends against the stability of many new Lancashire mills, is avoided. In the three years 1905—1907 new companies were formed with capitals amounting to fr 12,550,000 in 1905, fr 22,380,000 in 1906, and fr 26,200,000 in 1907.¹ These include private firms that were transformed into companies, but do not include existing companies that increased their capital, of which there were very many.

The chief centres of spinning and weaving are the same to-day as in the seventies, the industry having developed principally where it had already taken root, and only in a minor degree having been planted in distant parts, though it has spread over different towns and villages in the same region. The distribution of the spinning industry among the regions of Italy is roughly as follows —

Lombardy	1,850,000 spindles
Piedmont	1,000,000 „
Venetia	550,000 „
Campania	250,000 „
Liguria	250,000 „
Tuscany	100,000 „

The above six regions also contain the bulk of the power looms, ranking in this respect similarly as in spinning. Tuscany takes first place in the production of sewing cotton. The chief seats of hand loom weaving as an organised industry are Monza in Lombardy, Chieri in Piedmont, and Pisa in Tuscany. Domestic hand loom weaving is of most importance in Campania, Tuscany and the Marches.

Apart from Campania the cotton industry is almost

¹ There has been a very great slackening of the pace since then owing to the universal depression in the cotton trade.

entirely confined to Northern Italy. There are a few cotton factories and many hand looms in Sicily, but the industry has not attained any great importance in the island.

Within the regions mentioned there is a good deal of local concentration and some degree of specialism, especially as regards manufacturing, though there are a great many isolated mills in country districts. The following list shows the provinces in which the principal concentration of spinning and manufacturing exists —

Region	Province. ¹	Spindles	Power Looms
Lombardy	{ Milan	660,000	40,000
	{ Como	250,000	6,000
	{ Bergamo	450,000	13,000
	{ Brescia	310,000	1,500
Piedmont	{ Turin	470,000	22,000
	{ Novara	410,000	13,000
Venetia	Udine	240,000	3,500
Liguria	Genoa	210,000	6,000
Tuscany	Pisa	(few)	2,500
Campania	{ Salerno	150,000	1,600
	{ Naples	100,000	1,500

In the province of Milan there are several small towns mainly devoted to the cotton industry, notably Gallarate, Busto Arsizio, and Monza in all three of which the manufacture of coloured and fancy goods is extensively carried on, and Legnano which is an important spinning and manufacturing centre. The district between Milan and Lago Maggiore, including the provinces of Milan and Como, with its numerous mill villages linking up the manufacturing towns, bears a striking resemblance to Lancashire, but the manufacturing centres are smaller and the intervals between them longer. A large number of the factories of the province of Bergamo are

¹ Every large town is the centre of a province, which is an administrative area composed of the town and the surrounding districts.

situated in the Valle Seriana where there is abundant water power. Most of the firms in this district spin coarse to medium yarns and manufacture medium and heavy grey cloths.

There are several spinning mills and weaving factories in the city of Turin and its neighbourhood, where the finest spinning in Italy is done. In the province of Novara, which includes the important spinning and manufacturing town of Intra situated on the shore of Lago Maggiore, coarse and medium yarns and cloths are produced, the class of work resembling on the whole that of Lombardy rather than that of Turin. Biella, in the province of Novara, is the principal seat of woollen manufacturing with about 150 factories, large and small giving employment to over 25,000 workpeople. There are also several cotton factories, among the product of which may be mentioned coloured table cloths, ladies' dress goods, and heavy suitings in imitation of wool. Biella is called locally the Manchester of Italy, but this is a misnomer, for the principal industrial material is not cotton but wool. Some cotton and wool unions are manufactured, and a considerable quantity of raw cotton is mixed with the wool before spinning, so that Biella woollen goods really contain a large amount of cotton. In this respect the woollen industry of Biella resembles that which is carried on in Rochdale and the neighbouring districts on the borders of Lancashire and Yorkshire.

The coarsest spinning is done in Venetia where much Indian cotton is used, but there is also some spinning of fine yarns from Egyptian cotton in the rather important industrial town of Pordenone. The principal classes of fabrics manufactured in this region are coloured goods for the Levant and heavy grey cloths.

In Liguria and Tuscany the style of work resembles somewhat that of Turin, comparatively high counts of yarn being spun, and coloured dress goods of superior quality being manufactured. But the industry is far

less concentrated than that of Turin, and the average size of the establishments is smaller

A miscellaneous industry is carried on in Campania, including some of the branches undertaken in Lombardy and Venetia. In the province of Salerno the industry is of comparatively old standing but in that of Naples it is of quite recent growth and owes its origin to the encouragement of the Government. The poverty and unemployment prevalent in Southern Italy are evils of great magnitude, and the Government has endeavoured to alleviate them by granting facilities for the introduction of industries. To this end a "free zone" was marked out in 1904 in the neighbourhood of Naples, and firms that establish factories within it enjoy the following substantial advantages: exemption from rates and taxes for a period of 10 years, free provision of water for power for a like period, and permission to import machinery and plant free of duty. This policy has been crowned with considerable success, which would be even greater but for the fact that the quality of Neapolitan labour is low in comparison with that of Northern Italy. Many millowners in the North when extending their undertakings have weighed the advantages of building in the free zone of Naples instead of in the vicinity of their original works, and the general conclusion, so far as the cotton industry is concerned, is that the superior labour of Lombardy and Piedmont is worth more than the fiscal relief obtainable at Naples.

While certain classes of work sometimes preponderate in certain districts, there is no such complete specialisation as is known in Lancashire, and the description of any locality as the seat of any particular branch of the industry must generally be understood in a broad and rough sense.

CHAPTER XIII

SPINNING

SECTION I — *Raw Material and Classes of Work*

The chief sources whence raw cotton is obtained are the United States, India and Egypt, in the order stated. There is a small quantity grown in the south of Italy and in Sicily, but in comparison with the total consumption this is almost negligible. The Sicilian cotton is not as a rule spun by itself, but is mixed with Indian or American cotton. A certain amount of raw cotton is exported from Italy, but this is mostly Egyptian and to some extent American cotton, that is shipped to Genoa and thence sent by rail to Switzerland. The average annual excess of imports over exports of raw cotton since 1885 is as follows —

1885—1887	576,966 quintals
1888—1893	756,729 „
1894—1901	1,166,822 „
1902—1904	1,474,280 „
1905—1906	1,655,818 „

At the same time as the quantity of raw cotton consumed has been increasing, the average of the counts spun has been growing higher. It is not possible to present figures in support of this statement, though it is undoubtedly true that Italian mills no longer confine themselves to coarse counts, as they did a few years ago, yarns of 80s and even 100s to 120s counts being now spun regularly in some mills, especially in the Turin district. With this increase in the fineness of the yarns spun there has been a decrease in the proportionate

amount of Indian cotton and an increase in the proportionate amount of Egyptian cotton imported. Even now, however, the proportion of Egyptian cotton spun is very small compared with the English and Swiss industries, and the quantity of raw cotton consumed per spindle¹ shows that Italian spinning is on the coarse side.

The official figures showing the quantity of cotton of each kind imported in the years 1899, 1900 and 1901 are as follows —

	Quintals		
	1899	1900	1901
American	891,553	934,591	956,466
Indian	286,350	143,990	269,191
Egyptian	60,570	69,293	80,949
Miscellaneous	70,036	79,021	44,612
Total	1,308,509	1,226,895	1,351,218

The last item includes a small quantity of Turkish cotton, but is chiefly made up of American and East Indian cotton imported *via* England, France and Germany.

Specialisation is rarely carried so far in an Italian as an English mill, several counts commonly being spun in the same establishment in Italy, but in some few cases a high degree of specialisation is attained. As a rule a mill does not produce both fine and coarse counts, though this does happen in many cases. Generally a mill would spin, say, up to 32s, or from 12s or 20s to 40s or 50s, or from 40s to 80s. Italy cannot yet compete with England and Switzerland in the higher counts of yarn, except in her own protected market, but in the lower and medium counts she does a considerable and

¹ See p 9. In 1909 there were slightly over 200 000 spindles returned as spinning Egyptian cotton.

growing export trade with Egypt, Turkey, the Balkan States and South America, and in the class of work at present within her range, she can produce yarn of fairly good quality at a cost that enables her to compete in neutral markets even with the highly developed industry of Lancashire

SECTION II — *Power, Equipment and Working* ¹

Italian mills are mostly modern and fairly large buildings. They are constructed in the style of the most perfect and up-to-date Lancashire mills, many Italian mills being planned by Lancashire engineering firms, which supply the textile machinery. They are mostly two or three storey buildings of red brick, though some new mills have been built of reinforced concrete, while many are one storey shed buildings. The larger ones are almost all provided with sprinkler installations ². The chief difference between an Italian and an English mill externally is that the former is handsomer, as Italian owners take more pride in appearances and are willing to spend a little more on decoration. Internally the most obvious difference is that Italian mills are more roomy and spacious, gangways being wider and the distance between machines being greater, so that people can move about with greater convenience, and working and cleaning are easier and safer. This all means, of course, that even if other things were equal, an Italian mill of a given number of spindles would cost more to build than an English one, but the owners think the advantages worth the extra outlay.

Electric power is largely and increasingly used for driving. Many mills are built on the banks of streams from which electric power can be generated though in

¹ Cf. Appendix to this chapter

² These get a rebate of 25 to 30 per cent. from the fire insurance companies. See article 'Fire Insurance of the Cotton Mills of Italy' in the Report of the Sixth International Congress of Cotton Spinners and Manufacturers Associations (1909)

THE COTTON INDUSTRY

Some cases the machinery is driven directly by water turbines, as in Switzerland. Italian mills being as a rule larger than Swiss, they are seldom situated on streams that supply sufficient power to drive all their machinery, so that auxiliary power must as a rule be provided. And owing to the growing magnitude of the industry it is no longer possible to find suitable sites on the banks of streams for all the new mills. Hence the water power which is abundant in the Alpine valleys is utilised to generate electricity which can be conveyed considerable distances to the mills by insulated wires. In some cases the mills generate their own power, in others they obtain it from a central distributing station. Where a mill generates electric from water power, it is sometimes necessary to have a steam engine in reserve in case of temporary shortage of water, but owing to the Italian system of erecting power generating works at suitable places where a constant supply of water can be obtained, the Italian industry is less dependent than the Swiss on auxiliary steam engines. However, in some cases it is more advantageous to employ steam than electrical driving, chiefly in the case of mills situated at a great distance from supplies of electric power. In such cases it largely depends on the amount of power required as to which is the more economical system. Generally the greater the amount of horse power required, the less is the disadvantage of steam, and consequently large mills that are at a distance from any available water power frequently prefer steam driving. Steam engines of the Lancashire type are most common, but they are nearly all of Italian make, Italian engines being so satisfactory that they are exported in large numbers to other European countries, including England. Those that are not made in Italy are almost all of Swiss make, and in the older mills Swiss engines are the rule, the Italian industry being of comparatively recent development. Similarly, electrical machinery

was formerly almost all imported from Switzerland, but most of the new electrical plant is made in Italy where the electrical engineering industry has made rapid strides in recent years. In a few instances steam turbines are used to generate electricity where water power is not available, owing to the preference for the electrical drive, but this is very unusual. Rope driving is most commonly employed in steam driven mills. A common method in electrically driven mills is to have each line of shafting driven by two motors, one at each end, but the amount of sectional and individual driving is increasing, especially in the case of ring frames, which are driven very often by separate motors with speed regulators, which are of great advantage in certain circumstances.

The system of separate driving of sections or individual machines is considered so advantageous, both for the saving caused by the prevention of waste of energy in transmitting the power, and also for the greater regularity of the drive and the possibility of separate regulation of speed, that it has been applied in one or two cases in mills driven directly by water. In one large mill situated near a fine waterfall of 500 or 600 metres from which it derives its power, every machine is driven by its own small turbine, of about one foot in diameter, to which the water is conducted in pipes. Each machine can be regulated by turning a tap. In another mill the same system is applied somewhat less completely, each shaft being driven by a separate turbine to which the water is similarly led in pipes. This system can only be employed when a supply of very pure water is available, as otherwise there would be great trouble with the turbines getting clogged or the pipes stopped, and so forth.

The water turbine drive is the cheapest, where it is practicable, as there is no expense beyond the initial cost and repairs, but in quality and regularity it is

inferior to the electric drive. The cost of electric power when supplied in large quantities by a central distributing station is usually from 90 to 100 francs per H P per year, but as much as fr 120 is paid in some cases. The cost of installing an hydro-electrical plant for a factory varies from fr 500 to fr 700 per H P according to proximity of water, size of plant and other conditions, and the annual cost of driving, including depreciation and repairs, interest and running expenses, amounts to 15 per cent of the cost of installation, that is, the annual cost is from fr 75 to fr 105 per H P per year. The cost of steam driving is on an average from fr 120 to fr 150 per H P per year. On the whole, therefore, in cost as well as efficiency electrical is more advantageous than steam driving in Italy. In a few cases gas engines are used but it would seem that they are only preferable to steam or electric driving in the case of small mills where not very much power is required, and even in such cases electric driving is generally preferred, but gas engines are employed in one or two important mills where electrical power cannot be easily or cheaply obtained.

The equipment of Italian mills is very similar to that of modern English mills, much of the machinery, indeed, coming from Lancashire though a fair quantity comes from Switzerland. Italy does not herself manufacture spinning machinery. To particularise, practically all opening, scutching, carding and combing machinery is English, as are also the majority of drawing and fly frames, though some of these are Swiss. Most mules are English, though Switzerland supplies much more of these than of preparation machinery. The class of machinery of which Switzerland supplies most is the ring frame, many spinners preferring the Swiss frames, especially for worst spinning. However, the Swiss industry is small and therefore cannot supply anything approaching the whole of Italian requirements,

so that in this branch also English makers supply the major part of the Italian demand. Switzerland has the advantage over England of close proximity to the Italian market, and also the fact that many mills are owned by Swiss, and that many Swiss engineers are employed in the Italian industry, must exert an influence favourable to Switzerland. However, English makers devote much attention to the Italian market and are well represented there, and as the Swiss industry in any case can only supply a limited quantity of machinery, while the advantage in point of price generally rests with England, the bulk of the trade falls to English makers, who have no serious competition to face except that of Switzerland.

As Italy imports all her spinning machinery, it is necessary for each mill to have its own small shop and foundry where minor repairs can be done. The firms that supply the machinery send fitters to supervise the fixing of it in the mill, and charge inclusively for the machinery completely installed. There is a duty of six centimes per kilogramme on the gross weight of imported machinery, or, say, about 2s 6d per cwt. The total cost of textile machinery is about 30 per cent more than in England.

The bulk of the machinery in Italian mills being English, it is naturally similar to that in English mills. The only important difference is that the mules in Italian mills are usually shorter than in English, the number of spindles per mule varying from 750 to 1,100 and being mostly between 850 and 1,000. Italian machinery is new and uniform, for in the older mills it is customary to scrap obsolescent machinery and as far as possible to keep abreast of the newer mills in equipment. The shortness of Italian mules cannot therefore be due, as in Switzerland, to the survival of old machinery, nor to the necessity of adapting new machinery to old buildings, for most of the mills are new and designed specially for the work to be done in

them. It is owing to these differences in conditions that Italian mules are as a rule longer than Swiss, and the reason they are shorter than in England is that Italian labour not being so highly proficient as English, the spinners could not easily mind the mules of 1200 or 1250 spindles to which English minders are accustomed, and even with their shorter mules, the number of operatives per pair is greater than in England, for whereas here one spinner and two piecers would mind a pair of mules of 1200 spindles each on medium counts, in Italy the number would be one spinner, two piecers and two creelers per pair of mules of 1000 spindles each. Medium counts are usually spun on ring frames in Italy, mules being generally reserved for coarse and fine counts. On coarse counts there is usually one operative extra per pair of mules both in England and Italy.

The number of workpeople per 1000 spindles in Italy is more even than in Switzerland, being from seven to ten according to the counts of yarn spun, and the average number in a normal mill would be eight or nine per 1000 spindles. But the great majority of the spindles are ring spindles, which require a greater number of operatives than mule spindles,¹ though mule minders must be highly trained men, while ring frame tenters are less skilled female operatives. A great deal of reeling is done in Italian mills, which adds considerably to the number of workpeople required. Ten years ago the number was 13 operatives per 1000 spindles in mills where now only 9 operatives per 1000 spindles are employed, and according to an American Consular report of 1882 (quoted by G. von Schulze-Grevernitz on the Cotton Trade) there were then 10, 15, and even 20 operatives per 1000 spindles.

It is impossible to give the average speed of machinery, as it varies according to the class of work. On the

¹ As ring spindles are more productive than mule spindles, a greater quantity of preparation machinery is needed to supply a given number

whole it may be said that in Italy spinning machinery is run as quickly as in England and much quicker than in Switzerland, at least as regards ring spindles, which sometimes reach a speed of 12,000 revolutions per minute, usual speeds, excluding very coarse and fine counts, being between 9,000 and 11,000 revolutions per minute. The speed of mule spindles is between 8,000 and 10,000 revolutions per minute, the latter being frequently attained. The productions obtained in Italian spinning mills are on the whole distinctly good and compare not unfavourably with those common in Lancashire. This high standard is only reached, it is true, by the employment of a great number of workpeople, but it is probably easier to educate workpeople up to tending more machinery than it is to induce them to consent to speeding up machinery if they get used to a slow rate of running, and probably in the future Italian spinners will be able to obtain their high production without employing such a great amount of labour. Meanwhile wages are much lower in Italy than in England or even Switzerland, so that the net cost of labour is probably less than in England or Switzerland.

An important element in the high productivity of Italian mills is the fact that their design and equipment are so modern and excellent. Great attention is paid to the arrangement of the machinery in the various departments so as to economise time and labour as much as possible. The arrangement of mixing and blowing rooms is generally much the same as in Lancashire mills. Where American and Indian cotton are spun together, they are usually left in the mixing room two or three days. It is unusual to pass cotton straight on from the bale breaker to the opener without other mixing, though this is sometimes done, as also in Oldham. A fairly common arrangement in the cardroom is to have the cards down the whole length of one side of the room, then the drawing frames stretching from end to end

down the middle of the room, then the slubbing frames lengthwise from the top to the bottom of the room, and then down the side far from the cards, the intermediate and roving frames at right angles to the slubbing frames, arranged in the manner of one intermediate and two roving frames alternately. In some mills the fly frames are partitioned off from the cardroom. Spinning rooms resemble those in England. Where widely different counts are spun in the same mill the machinery is often arranged in blocks or sections for the different kinds of work.

England has an advantage over all Continental countries in the dampness of her atmosphere, but by means of artificial humidification it is possible to produce good spinning conditions even in a dry country, and much attention has been paid to this in Italy. The humidification of mills is of course expensive, but nowadays it is so important to have regular atmospheric conditions that humidification has to be extensively practised even in Lancashire, so that Italy's disadvantage in this respect is not so great as might at first appear, especially as the plains of Lombardy and Piedmont, unlike other parts of Italy, are subject to heavy rains and much humidity, except during the summer months, when the weather is hot and dry. The system most generally employed in the finest and newest mills is that described as being found in two or three establishments in Switzerland, namely, that of emitting damp air into the rooms through grids in the floor, in the case of sheds, and through grids in hollow buttresses through which the air is conducted, in the case of high buildings.¹ Where this system is employed it serves also the purpose of ventilation, the air being changed frequently, perhaps five times per hour. This system can also be employed for heating purposes, the air being heated to the required temperature in the storage chamber before it is emitted

¹ See pp. 38-39

into the rooms. Sometimes humidification is effected by the system most prevalent in Switzerland, namely, that of emitting damp air into the rooms through pipes near the ceiling. This system is not so good as the first mentioned, though more economical, as the damp air cannot be introduced in such great volume, and though it provides ventilation, it does not do so in such a thorough and effective manner as the other method. It does not suffice for heating purposes, so where it is employed there must be a separate system of heating by steam pipes. A third means of humidification that is sometimes employed in the smaller mills is the injection of fine sprays of water into the rooms, which is a common method in Switzerland. With this system again, there must be arrangements for heating the mills by steam pipes, and also as this last system of humidification provides no means of ventilation, some other means must be adopted, sometimes air canals are laid under the floors, and the air is allowed to escape into the rooms through grids, and in some cases warm air is introduced in this manner, thus providing a combined system of heating and ventilation, while humidification is effected by the sprays of water.

Electric lighting is employed in nearly all mills, the most usual styles in the larger concerns being arc lamps or indirect (reflected) electric light.

The cost of erecting and equipping a mill naturally varies a good deal according to the type of building and the locality, it ranges from fr 50 (£2), or sometimes rather less, up to fr 75 (£3) per spindle, but the latter figure is exceptionally high. Land in country districts costs about fr 2 per square metre, and in the outskirts of manufacturing towns fr 5 per square metre and upwards.

APPENDIX

TABULATED PARTICULARS OF TEN SPINNING MILLS

MILL	No 1	No 2
POWER	Water turbine and Steam engine, also 800 H P Electric generated by themselves	Water turbine, 250 H P, Electric 300 H.P
OPENING	1 Bale breaker 3 Crighton openers	1 Bale breaker 1 Crighton and 1 Theller opener
SCUTCHING	5 inter and 5 finish	4 inter and 4 finish
CARDING (revolving flats)	110, production 55 k per hour	62
COMBING	—	—
DRAWING FRAMES	120 finish deliveries Production 55 k per delivery per hour	7 of 3 heads and 6 deliveries
SLUBBING FRAMES	12 of 94 spindles	7=476 spindles
Spindle revs per min and production per hour	700 revs, 0.87 hanks 0.75s	—
INTERMEDIATE FRAMES	22 of 136 spindles	11=1,328 spindles
Spindle revs per min and production per hour	900 revs 0.91 hanks 1.25s	—
ROVING FRAMES	41 of 186 spindles	22=3 424 spindles
Spindle revs per min and production per hour	1 300 revs. 0.82—0.91 hanks 4s—6s	—
JACK FRAMES	—	—
Spindle revs. per min and production per hour	—	—
RING FRAMES	140 of about 430 spindles	51=18 955 spindles
Spindle revs per min. and production per hour	11 000 revs, 0.7 hanks 40s	9 000—10 000 revs, 0.8 hanks 24s
MULES	—	8=6 288 spindles
Spindle revs per min	—	8 500—9 000
Spindle production per hour	—	0.55 hanks 18s
TOTAL SPINNING SPINDLES	60 000	25 243
DOUBLING SPINDLES	10 000	—
OPERATIVES	800	240
OVERLOOKERS	—	—
(spinning and preparation)	4	2 and 1 assistant
HOURS OF WORK	11 Saturday 9	11, Saturday 9½
COTTON USED	American 30 mm. imported direct	American
COUNTS SPUN	Average count 40s	8s—44s
GENERAL PRODUCTION OF YARN	4,500 kilos per day	—
DESTINATION	Own weaving shed and home market	Own weaving shed

No 3	No 4	No 5
Water turbine and Electric (Individual drive for rings)	Electric from central station (Individual drive for rings)	Electric 350 H P
1 Bale breaker, 2 Crighton exhaust openers	1 Bale breaker 3 hopper fed openers combined with scut chers	1 Bale breaker and 2 openers
4 machines	4 inter and 4 finish	1 inter and 2 finish
58	80 production 15 k per hour	45 production 10-5 k per hour
—	—	12 machines of 7 heads each for Egyptian cotton
12 of 3 heads and 8 deliveries	100 finish deliveries	3 of 3 heads and 8 deliveries, 6 ends up for Egyptian
		1 of 3 heads and 7 deliveries 6 ends up for American
		1 of 3 heads and 4 deliveries, 6 ends up for American
10 of 96 spindles	10 of 94 spindles	5 of 36 spindles
0 55 hanks 0 2s	1 4 hanks 0 6s	680 revs
16 of 116 spindles	18 of 132 spindles	0 of 132 spindles
0 91 hanks	1 1 hanks 1 3s	800 revs
16 of 146 spindles	37 of 172 spindles	11 of 188 spindles for Egyptian
0 82-0 91 hanks	0 9 hanks 3s	3 of 168 spindles for American
—	—	1 100 revs
—	—	17 of 220 spindles for Egyptian
64 of 416 spindles	102 of 480 and 600 spindles	9 of 196 spindles for American
		1,250 revs
		44 of 500 spindles for Egyptian,
10,200 revs 0 73 hanks 28s	12 000 revs, 1 hank 26s	28 of 350-400 spindles for American
—	10 of 770 spindles	9 000-10 000 revs, 5 kilos
—	7 000-8 000	40s-60s Egyptian twist per frame
—	0 6 hanks 12s-15s weft	10 of 1 000 spindles for Egyptian
26,624	57 700	8 000-10 000 revs 4-4½ draws
—	—	4-4½ kilos 60s-80s weft per mule*
250	480	45 440
		9 060
2 spinning 3 preparation	3	450
11, Saturday 9	10 (scutchers and cards also night shift of 8½ hours)	5
American, imported direct	American bought direct and from Liverpool	10½
10s-44s	18s-32s twist	Egyptian, bought direct;
—	10s-50s weft	American 28-30 mm, bought from Liverpool
Own weaving shed	Own weaving shed and home market	40s-80s Egyptian
		88s-50s American
		2 600-2 700 kilos per day Egyptian
		Own weaving shed, home market and Levant

* This figure is highly improbable.

MILL

No 6.

POWER	Electric (motor to each shaft) 1 300 H P
OPENING	1 ^c Bale breaker 2 single and 2 double Crighton exhaust openers
SCUTCHING	4 inter and 4 finish
CARDING (revolving flats) COMBING	140 —
DRAWING FRAMES	12 of 3 heads and 6 deliveries
Production	—
SLUBBING FRAMES	12 of 90 spindles
Spindle revs per min and production per hour	600—650 revs 1 1 hanks 0 6s
INTERMEDIATE FRAMES	24 of 140 spindles
Spindle revs per min and production per hour	800 revs 0 8 hanks 1 2s
ROVING FRAMES	50 of 180 spindles
Spindle revs per min and production per hour	1,020 revs 0 75 hanks 3 5s
JACK FRAMES	—
Spindle revs per min and production per hour	—
RING FRAMES	108 of 400 spindles
Spindle revs per min	7,500 up to 20s, 8 500 over 20s
Spindle production per hour	0 82 hanks 18s—20s, 0 7 hanks 32s
MULES	26=21,400 spindles
Spindle revs per min	7 500
Spindle production per hour	0 55 hanks 13s
TOTAL SPINNING SPINDLES	64 600
DOUBLING SPINDLES	10 000
OPERATIVES	659
OVERLOOKERS (spinning and preparation)	2 and 4 assistants
HOURS OF WORK	11
COTTON USED	Indian and American
COUNTS SPUN	Up to 16s Indian 18s to 32s American
GENERAL PRODUCTION OF YARN	—
DESTINATION	Home market and Levant

No 7	No 8	No 9
Steam 1 000 H P Gas engine, 500 H P including weaving shed	Steam engine 400 H P	Water turbines
1 Bale breaker 1 hopper fed opener for medium and 1 for coarse cotton 2 openers for waste	1 Bale breaker, 1 hopper fed Crighton openers	1 Bale breaker 2 Crighton openers
3 scutchers for medium 2 for coarse and waste cotton All cotton scutched once	1 inter and 1 finish	3 inter and 3 finish
86, production 6 5 k. per hour	26 production 3 8 k per hour 2 drawing frames of 1 head prior to 4 ribbon lap machines 17 combing machines of 8 heads	80, production 3—7 k per hour 4 drawing frames of 1 head prior to 4 ribbon lap machines 15 combing machines
8 of 3 heads and 8 deliveries	2 of 3 heads and 6 deliveries	10 of 3 heads each 5 or 6 deliveries
2 8—2 9 hanks=7 k per de livery per hour	—	—
6 of 100 spindles	2 of 60 spindles	9 of 50—60 spindles
700 revs 1 2 hanks 0 5s	460 revs 1 1 hanks 0 9s	—
12 of 140 spindles	2 of 1 4 spindles	13 of 130 spindles
800 revs 1 hank 1 2s	640 revs 0 95 hanks 1 7s	—
30 of 180 spindles	5 of 160 spindles	15 of 170 spindles
1,300 revs, 0 95 hanks 3s	950 revs 0 8 hanks 4s	—
—	18=3 368 spindles	15 of 200 spindles
—	1 214 revs 0 55 hanks 13 s	—
34 of 500 spindles twist,	4=1 620 spindles	35 of 350—450 spindles
28 of 530 spindles weft,	7 600	5 000—8,500 revs
9 000 weft 9 500 twist,	—	On 40s twist, 8 500
0 9 hanks 32s twist	—	0 7s hanks 30s
0 95 hanks 22s weft	—	—
1 hank 20s (average)	15 of 900 and 9 of 990 spindles	4 of 530 spindles for coarse yarns
—	—	16 of 1 120 spindles for fine and medium yarns
—	8,500	4,000—10 000 on 40s twist
—	0 42 hanks 76s	9 000 on 40s weft 3 000
31,840	24 030	0 7 hanks 30s
—	5,516 (12 gassing frames of 118 drums each)	34,000
370	210	4 200 (gassing department)
2 and 2 assistants	2 and 2 assistants	400
10	10	9 (all departments)
American. They consume their own waste	Egyptian and Ssa Island	11
12s—32s average 23s—24s	40s—120s, average 76s	American and Egyptian
5,500 k. per day	—	8s—80s
Own weaving shed	Mostly home market, some export to America	One million kilos per year
		Home market
		Abnormal

MILL

	Egyptian cotton
POWER	
OPENING	1 hopper fed single opener
SCUTCHING	
CARDING (revolving flats)	
COMBING	12 machines 8 heads each
DRAWING FRAMES	2 of 3 heads and 4 deliveries
Production	36 4 k per frame per hour 0 2s
SLUBBING FRAMES	4 of 32 spindles
Spindle production per hour	1 hank 1 15s
INTERMEDIATE FRAMES	3 of 120 spindles
Spindle production per hour	0 78 hanks 3s
ROVING FRAMES	12 = 2 256 spindles
Spindle production per hour	0 55 hanks 12s
RING FRAMES	85 of 440 spindles spinning and 24s—50s weft from American
Spindle revs per min	0 77 hanks 40s twist
Spindle production per hour	0 61 hanks 50s twist
	0 59 hanks 60s twist
	2 of 840 spindles spinning 40s—80s weft
MULES	
Spindle revs per min	
Spindle production per hour	
TOTAL SPINNING SPINDLES	
DOUBLING SPINDLES	
OPERATIVES	
OVERLOOKERS (spinning and preparation)	
HOURS OF WORK	
COTTON USED	
COUNTS SPUN	
DESTINATION	Medium and high counts for

No 10

American cotton 24s—50s

American cotton 10s—20s

Indian cotton 4s—8s

Steam engine

1 Bale breaker

3 hopper fed combined openers

6 inter and 6 finish

100, production 5 k per hour

6 of 3 heads, each
4 or 6 deliveries
0 16s
7 of 52 spindles
1 2 hanks 0 7s

4 of 3 heads each 4 or 6
deliveries
0 12s
5 of 38 spindles
1 hank 0 46s

1 of 3 heads and 4 deliveries
0 10s
1 of 32 spindles
1 2 hanks 0 4s

8 of 140 spindles
0 91 hanks, 1 4s,
0 82 hanks 1 2s
25 of 172 spindles
0 64 hanks 3 4s—5 75s

5 of 120 spindles
0 82 hanks 1s
12 of 140 spindles
0 64 hanks 2s

1 of 120 spindles
0 89 hanks 1s

0s—50s twist and up to 80s weft from Egyptian, and 12s—36s twist
cotton

9,500

0 64 hanks 24s twist

0 69 hanks 24s weft

0 66 hanks 24s average

10 of 840 spindles spinning weft 10s—20s American
and 4s—8s Indian

8 000—10 000

0 6 hanks, average 24s

47 480

1 440

170 men and boys and 300 women and girls

2 and 4 assistants

11

Egyptian American and Indian

4s—80s

own weaving shed, low counts for South America and the Levant especially Bulgaria

CHAPTER XIV

WEAVING

SECTION I — *Glasses of Work in Factories*

Most of the yarn used by the manufacturing industry is of Italian spinning. Some English yarn and a very little Swiss yarn of the higher counts are used in the manufacture of fine fabrics, but the quantity of imported yarn grows steadily less as the home spinning industry develops. The Italian weaving industry besides supplying almost all the demand for cotton goods of the native population of nearly 35,000,000, satisfies a large proportion of the wants of the Levant and South America. The trade with Argentina and Brazil is stimulated by the growing numbers of Italian immigrants, who demand large quantities of cotton goods of miscellaneous styles and designs similar to those which Italian taste prefers at home.¹

Generally Italian factories confine themselves to a more or less narrow group of related cloths, though it is very rare for a factory to work entirely on one style of cloth, except in the case of factories that belong to calico printing companies, which are devoted to the manufacture of printing cloths for the company's works.

The grey cloth factories may be roughly divided into (1) those that make heavy domestics, twills and labots, (2) those that make medium cloths (plain, twill and sateen) for dyeing, bleaching and printing, and (3) those that make fine plain cloths, such as cambrics, and fancy figured cloths, for dyeing or bleaching. Sometimes one factory may make goods belonging both to classes (1) and (2), or (2) and (3), or even to all three classes, though in the main these divisions are fairly observed, but within the divisions almost any and every style and quality may be made in the same factory. The manufacture of towels, handkerchiefs, tablecloths and such

¹ Cf. N. L. Watson 'The Argentine as a Market' p. 76

miscellaneous articles is not as a rule carried on in specialised factories, but is distributed amongst those doing various classes of work

In coloured goods factories a great number of different articles are made, for example, in one factory 100 different qualities are manufactured, but here again it is customary for factories to confine themselves to a certain broad class of cloths. Some factories are chiefly employed on ladies' dress goods of superior qualities, including Jacquard cloths, and high-class Oxfords, Zephyrs and coloured shirtings, while others confine themselves to the cheaper qualities of these goods. A rather specialised trade is that in coloured cotton suitings and trouserings, of which large quantities are exported to the Levant and South America. These goods are sometimes manufactured in factories that also make other articles, but they are oftener the sole or at least the principal class of goods produced. The chief seat of the manufacture of these cloths is Busto Arsizio. The makers raise and finish the goods themselves, and they succeed in giving them a feel and appearance remarkably similar to wool. A somewhat similar, though less specialised, class of work is the manufacture of short nap flannelettes for printing. This is carried on in several factories together with other heavy goods, and the raising is always done by the printers, and with such success that Italian printed flannelettes have driven English printed meltons (mixed wool and cotton stuffs) from several Eastern markets, while Italian dyed flannelettes in many places compete with dyed English union cloths. Velvets, tapestries and upholstery cloths are usually manufactured in specialised establishments. The first-named are as a rule only cheap qualities, better class cotton velvets being imported from England, but in tapestries and upholstery cloths the Italians not only supply their own market but do a considerable export trade.

Firms which own more than one factory often do very different classes of work in the several factories, sometimes grey cloth being manufactured in one and coloured woven fabrics in another. Many manufacturers sell the whole product of small factories that work for them under contract.

Italy has achieved greater excellence in fabrics than in yarns, for whereas the latter are distinguished mainly for their cheapness, the former can in addition claim high rank for the excellence of their quality and workmanship. In cotton goods it is increasingly difficult for English or other foreign firms to do any trade with Italy except in a few specialities, as in all staple articles the country is quite able to supply its own wants. Moreover in both grey and coloured goods Italians are able to compete with other countries in the world's markets, and in some classes of cloth they are unrivalled. For example, in Smyrna, English and American cabots are being largely displaced by Italian, and Italian grey cloths of all kinds are in great favour in the Levant. Italian bleached shirtings not only have gained an assured position in the Levant and South America, but are being increasingly sold in India, largely through English shippers who receive the orders from Indian importers and pass them on to Italian manufacturers, when these, as often happens, are able to quote lower than English makers. Similarly in fancy coloured goods Italian manufacturers are gaining a good deal of business through English shippers who formerly only sold English cotton goods. Woven fabrics are exported to China and Japan, as well as to India, but as yet not in large quantities.

SECTION II — *Equipment and Working*¹

Practically all Italian weaving factories are one storey sheds with saw-tooth roofs, as in Lancashire, whether

¹ Cf. Appendix to this chapter

they are independent or whether they form a branch of an establishment carrying on also spinning and finishing, for though in the general prevalence of integration instead of differentiation of functions the Italian resembles the American rather than the English industry, the American system of housing the spinning and weaving machinery in one building is quite unknown in Italy.

The most popular method of driving weaving factories is perhaps by electricity, though water turbine and steam driving are common, and gas engines are occasionally used. As regards factories situated similarly to spinning mills, nothing further need be said, but the numerous independent weaving factories situated in such towns as Turin, Busto Arsizio and the other manufacturing centres, are compelled either to have steam driving or to obtain electric power from a central distributing station. In either case, owing to the smaller amount of power required, the cost per H P is greater than in the spinning mills. Thus in Busto Arsizio the average cost of electric power supplied to weaving sheds is fr 180 per kw per year, but in some parts the cost may be less, say, fr 160 per kw (i.e., about fr 120 per H P) per year, though on the other hand it is often more. At these rates there is little advantage in electric power, and therefore it is very common for weaving sheds in the towns to be driven by steam. In those sheds that are driven by electricity the looms are often driven by separate motors, like the frames in spinning mills.

In point of equipment the average Italian weaving shed is equal to a first-rate English shed, the only noticeable difference being that in Italian sheds the machinery is less crowded, and there is more room to move about. Most of the sheds being new, the machinery is also new, and even in the case of old-established concerns there is but little very old machinery to be seen.

The bulk of the machinery is English or Swiss, but some Italian and German machinery is used. There is

one fairly important Italian firm of loom makers which has equipped several factories in whole or in part, and has exported machinery to Brazil, but it can only supply a limited portion of the Italian demand ¹

There are many Jacquard looms in Italy, Jacquard weaving being much more important than in Switzerland, but it is not usual for a shed to be equipped entirely with Jacquard looms. In one shed there are 500 Italian looms fitted with English Jacquards and harnesses. An air suction pipe is occasionally used for threading shuttles, which avoids the unhealthy method of threading by the mouth, and in some cases looms are fitted with an automatic warp stop motion. In the department of preparation there is little of special note, except as regards sizing. Ball sizing is not practised, but slasher sizing is the prevailing method, English, Swiss and German machines being used. For coloured goods Scotch dresser sizing is largely employed, though not to the same extent as in Switzerland, dyed yarns being often sized in the hank. All the Scotch dresser machines are of Swiss make, while for hank sizing Italian machines are used. In the winding department of weaving sheds Barber knotters are frequently used.

In one particular the equipment of Italian sheds is particularly interesting, namely, in the extent to which Northrop looms are used. It is much more necessary to employ automatic looms in countries such as Italy or the Southern States of North America than in countries like England and the Northern States of the Union, where there is a highly-trained and efficient operative class. Whereas an English weaver tends four and sometimes six plain looms, an Italian weaver tends two looms as

¹ One manufacturer whose shed is equipped with German looms bought them because the makers were willing to build him a loom to suit his requirements whereas English makers offered him looms that were too heavy, and Swiss makers offered him looms that were too light for his purpose, and neither would alter their usual pattern to suit him.

a rule, rarely three and only exceptionally four. In Italy weavers tend four looms fitted with a warp stop mechanism, but in the Northern States of America they tend eight¹. It is thus apparent that Italian manufacturers stand to gain more than English if they can employ a good and not too expensive automatic loom, and to a large extent the Northrop loom has met their requirements. It is employed in several large plain cloth factories, and there are some Northrop looms with dobby harnesses in work. However, even in plain cloth factories ordinary looms still form the vast majority, no doubt owing to the high cost of the Northrop loom. All the Northrop looms in work in Italy are from Ruti in Switzerland.

The saving in labour is very great with Northrop looms, in one factory each weaver minds 12 looms, and in another one weaver with one young assistant to fill the magazines tends 14 looms, and these are both representative factories. In this respect Italy shows a decided superiority over Switzerland, where the most expert weavers only tend eight Northrop looms, this is the more surprising in view of the fact that a Swiss weaver tends on the average more ordinary looms than an Italian weaver. The speed is higher and the production is greater in Italy. In the first of the above-mentioned factories the looms, 120 cm. in width, are run at the rate of 180 picks per minute, and the effective production is 92 per cent, and in the other factory, where coarser cloth is woven, the looms, 110 cm. wide, are run at the rate of 175 picks per minute, and the effective production varies from 90 per cent to 92 per cent. These speeds and productions are very good, being about equal to English work.

With ordinary looms a higher speed is attained, but the effective production is less. As in spinning mills, machinery is run very quickly, though there is a good deal of variation between the practice of different facto-

¹ But eight-loom weavers are unknown in England

ries In some factories narrow looms making plain medium cloths run at a speed of 240 picks per minute, and a speed of 220 picks per minute is quite common. It is not easy to give an average speed of fancy looms, as styles of cloth and general conditions vary so much. Naturally the speeds are much slower than in the case of plain weaving, though occasionally fairly high speeds are attained, dobby looms 1 m wide sometimes running at 190 and Jacquard looms at 185 picks per minute. Perhaps 120 to 160 picks per minute according to the width of the loom may be given as ordinary speeds for fancy looms.

The average effective production with ordinary looms weaving plain cloth is 75 per cent to 80 per cent of the theoretical maximum, though a higher production is sometimes obtained. On fancy looms weaving simple designs the average effective production is 70 per cent to 75 per cent but as high a production as 80 per cent is occasionally reached. In factories where elaborate fancy designs are woven the average effective production is 60 per cent, though it sometimes reaches 70 per cent or even 75 per cent.

In view of the high speed at which machinery is usually run the effective production is very good, being nearly if not quite equal to that obtained in England. As the Italian working week is longer than the English the actual weekly production would in most cases probably be greater in Italy.

The labour cost of production is generally less in Italy than in England, but whereas in the latter other expenses are reckoned at about 100 per cent of the weavers' wages, in the former they are estimated at 150 per cent of the weavers' wages for plain goods and 200 per cent for fancy goods. When everything has been taken into account it is found that the cost of production of some articles is lower in Italy and that of others in England. But an exact comparison is difficult.

The systems used for humidifying spinning mills are used also for weaving sheds, the majority of which are humidified, but humidification by means of air canals is less common, and humidification by fine sprays of water is more common. Where the air canal system is employed it also serves for heating and ventilating purposes.

The most usual method of lighting weaving sheds is by electricity, but arc lamps and reflected lighting are less common than in spinning mills, many sheds being lighted by electric incandescent lamps. In some of the older factories the lighting is by ordinary gas jets or by incandescent gas.

The cost of erecting and equipping a weaving factory varies, of course, according to the class of work, a plain cloth factory will cost much less than a fancy goods factory, as it will be equipped with simpler and less expensive machinery. The cost of a small shed of 150 looms for weaving fancy coloured goods was fr 450,000 (£18,000), inclusive of a dyehouse for dyeing the yarn and a department for finishing the cloth. A shed of 1,000 looms, part Jacquard and part dobby, for weaving coloured goods, cost fr 6,500,000 (£260,000), inclusive of yarn dyeing and doubling departments, cloth finishing department, and cloth warehouse. The cost per loom, inclusive of all equipment but exclusive of the building, was fr 3,500 (£140). The total cost of a shed of about 300 fancy looms is usually from £80 to £100 per loom according to circumstances, including both building and machinery.

SECTION III —*Hand Weaving*

In Monza, which is the centre of tapestry weaving and the manufacture of upholstery cloths, hand weaving is still important, though power loom weaving is gaining ground. There are 31 weaving factories, mostly for the manufacture of coloured goods, with a total of 4,000 looms, so that the scale on which the industry is

carried on is small Eight of these factories are engaged in the manufacture of tapestries, two of which are equipped mainly with power looms, and the rest with hand looms of local make A Jacquard hand loom with drop box mechanism costs only fr 100 (£4), so that though a much lower production is obtained on the hand loom, its cheapness helps it still to compete with the power loom in this elaborate style of work

The value of the annual production of tapestry and upholstery cloths in Monza is about 4 million francs (£160,000), about half of which is for export, chiefly to the Levant, the Argentine and Brazil, and to a lesser extent to India and Japan The bulk of the yarn used is cotton, all of Italian spinning, but a good deal of silk and wool is also used The best qualities of woollen yarn are imported from Glasgow, while ordinary qualities are of Italian spinning Much of the silk yarn used is Japanese

In Chieri there are 25 hand loom weaving firms of which five or six are large and own some 500 or 600 looms each, while the rest own between 100 and 150 looms each The staple article of manufacture in Chieri is fancy dress goods for men and women, among specialities for the former being fancy waistcoats, another important class of goods is fancy coloured quilts There is a considerable export trade in articles of both classes, principally with South America For all these goods coloured yarns are used, which are for the most part dyed in small local dyeworks

One of the principal firms of manufacturers owns a shed equipped with 150 Jacquard and dobby power looms, from Ruti in Switzerland, together with hank dyeing and cloth finishing machinery from Germany It also possesses 60 or 70 Jacquard hand looms in the factory and about 500 hand looms, some dobbies and some 4 shaft, all with multiple shuttle boxes, distributed among the weavers' houses The weavers get the beams

of warp and the weft from the factory This is the only firm that possesses a modern weaving shed and dye-house The others possess only factories for preparation, with warehouses, and hand looms in the weavers' cottages The larger firms have also each a few looms, mostly Jacquard, in the factories, on which the most elaborate cloths and also patterns are woven, a few of these looms are power looms Some of the smaller firms give out the winding to be done in the work-people's homes

The hand weaving industry of Chieri is able to compete in its specialities not only with the power looms of Italy but also, seeing that it does a considerable export trade, with those of other countries This is partly due, as in the case of Monza, to the fact that it is engaged in the production of specialities, in which the advantage of quantity of production does not outweigh that of excellence of workmanship so much as in the case of more ordinary cloths Nevertheless the power loom has already made good its footing in Chieri, and it is probable that few new hand looms will be built, and that gradually power looms will replace the hand looms as they cease to work

In the province of Pisa there are 10 or 12 hand loom weaving manufacturers, who employ about 3,000 looms altogether The manufacturers only keep preparation machinery in their factories, along with the warehouses and offices A considerable part of the cloth is woven grey and dyed and finished in the piece by outside dyers

Both in the neighbourhood of Pisa and Monza there are several sub-manufacturers (*capì fabbrica*), who own small factories with about 20 to 40 hand looms each ¹ They work for the larger firms which supply them with beams and pirns from their preparation factories

¹ There are a few such small manufacturers in Campania who sell the product to Naples merchants

APPENDIX

TABULATED PARTICULARS OF TEN WEAVING FACTORIES

FACTORY	No 1	No 2
POWER	Water turbine and electric, the latter partly from own and partly from central generating station	Electric from own generating stations, water turbine and steam engine
SPOOL WINDING SPINDLES	960 with American cleaners (Barber knotters)	1 800 (Barber knotters)
WARPING MACHINES	4 English beam warpers and 4 American style for Northrops	17 beam warpers
SLASHERS	3 English and 2 Swiss machines	2 large and 6 small
LOOMS	Most looms are driven from below	
Plan and Tappet	500 ordinary 84—180 cm width 200 Northrop 110 cm width	} 1,940 of 72—175 cm width 60 of 80 cm width 72 cm plain, 280 Jacquard 120 Medium widths average 220
Dobby	—	
Jacquard	—	
PICKS PER MINUTE	33 ordinary 240 Northrop 175 39 3 ordinary 220 54 ordinary 180	Jacquard 120 Medium widths average 220
EFFECTIVE PRODUCTION	Ordinary looms 80% Northrop 90%—92%	Plain and dobby 78%—87%, Jacquard 80%
OPERATIVES	265 in weaving room	1 800
PREPARATION OVERLOOKERS	1	2
WEAVING FOREMEN	1	2 "
TACKLERS AND LOOM GAITERS	6 for Northrops for 2 shifts 15 for ordinary for 1 shift	25
HOURS OF WORK	Northrops, double shifts of 8 hours Rest, 11 hours	11 (9 on Saturdays)
YARNS USED	Northrops twist 14s—24s weft, 10s—20s Ordinary looms twist, 3s—24s weft, 4s—26s	Medium counts. Their own spinning
CLOTHS MANUFACTURED	Domestics T cloths and Cabots 10—15 reed x 10—15 picks per ¼" 50 / of weight 15 size	Calico domestic splits, flannelles sateens handkerchiefs, Jacquard cloths
GENERAL PRODUCTION	—	65 000 metres, average 16 picks per ¼" French, per day
DESTINATION	Domestics and T's for South Italy and Levant, Cabots for Levant. They export direct	To Italian calico printers and Italian wholesale houses that bleach or dye the cloth. Much is eventually exported

No 3

No 4

No 5

Water turbine and electrical	Electric from central distributing station	Steam engine and gas engine
750 (Barber and Cook knotters)	1 400	1 700
6 beam warpers	11 beam warpers	14 beam warpers 500 bobbins per creel
4	3	5
—	Ordinary looms 170 cm wide Northrop looms 120 cm wide	
400 of 107-160 cm width	200 ordinary 300 Northrop	1 420 36 —56 wide
155 of 134 cm width	400 ordinary 100 Northrop	80
84, 2 cylinder, of 105 cm width	—	
107 cm. plain, 180	Ordinary 170	36 220
160 cm. plain 140	Northrop 180	44" 190
134 cm dobby, 160		51 180
105 cm Jacquard, 180		50 165
75%—80%	Ordinary 83% Northrop 92%	80%
480	333 weavers	750 weavers
1	1	1 with an assistant responsible to manager
1	1	1 responsible to manager
7	17	—80
11 (10 on Saturdays)	10	10
8-44. Their own spinning	18s-32s twist, 10s-50s weft Their own spinning	
Domestics, T cloths twills, drills with two warps, reps sateens, flannelettes, piqués, figures	Plain and figured cloths including umbrella cloths for bleaching and dyeing in their own works	"Printers domestics twills, for dyeing or printing, in their own works
23,000-24,000 metres per day	—	60 000 metres per day
They bleach and dye a large part of the production in their own works, and export to the Levant	Home trade Export to Levant direct They sell to Italian shipping houses for South America and China, and to English shipping houses for India	Home trade, Levant and South America

FACTORY	No 6	No 7
POWER	Steam engine 170 H P	Steam engine * 250 H P
SPOOL WINDING SPINDLES	384 for warp and 40 for doubled weft	350 supplied by 2 300 doubling spindles
HANK WINDING SPINDLES	—	250 for warp 600 for weft
WARPING MACHINES	4 beam warpers, 600—600 bobbins per creel	12 horizontal sectional warpers
SLASHERS	1	1 German air drying machine
SCOTCH DRESSER MACHINES	—	—
LOOMS		80—180 cm wide
Plain and Tappet	—	300 most 4 shuttles
Dobby	485 many of which often run as plain looms	150
Jacquard	—	48
PICKS PER MINUTE	38 200 (161 looms) 50 175 (72 looms) 56 170 (54 looms) 60 ' 160 (128 looms) 64" 155 (72 looms)	Narrow looms, 180 Wide looms 140
EFFECTIVE PRODUCTION	70 %—75 /	75 /—80 /
OPERATIVES	240 weavers	500 (including doubling)
PREPARATION OVERLOOKERS	1	1
WEAVING FOREMEN	1	1
TACKLERS AND LOOM GAITERS	9	9 and 9 boy helpers
HOURS OF WORK	10	10½ nominal, 10 effective
YARNS USED	38s 50s, 60s 80s twist 32s—86s weft Their own spinning	6s—64/2 twist, 6s—30s weft, Italian spinning All dyed outside
CLOTHS MANUFACTURED	Cambrics sateens, linings, um brella cloth, figured dress goods	Mens suitings, raised and finished in imitation of wool coloured shirtings There are 4 raising machines
GENERAL PRODUCTION	11 000 000 metres a year, average 10 picks per centimetre	—
DESTINATION	They sell their production gray to Italian calico printers or wholesale houses that have the cloth bleached or dyed Much is eventually exported	South America India, China, Turkey and Egypt * A shed quite near to No. 7 and doing the same class of work is electrically driven

IN ITALY

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No 8	No 9	No 10
Steam engine	Steam engine	Steam engine
	350 H P	300 H P
450 (Barber knotters)	2 frames warp and 1 weft supplied by 1080 doubling spindles	900 winding from spools on to pirns for coarse weft 575 winding from bottle shaped bobbins on to pirns
—	22 frames warp and 20 frames weft	1 680 winding on to spools 100 winding on to bottle shaped bobbins
4 beam warpers ²	40 sectional warpers 400 bobbins per creel	21 beam warpers 500 bobbins per creel and 4 sectional warpers
1	{ 10 hank sizing machines	—
—		21
100—200 cm wide	90—140 cm wide	107—160 cm wide
5	350 2 4 and 6 shuttles	—
97—English looms Italian dobbies	400	338 4 and 6 shuttles
242	150	100 ,
Dobby 1 m 190 220 cm 106	120—160	107 cm 137
Jacquard; 1 m 2 cylinder		13 cm 134
183, 1 m single cylinder 155		115 cm 130
190 cm 140		160 cm 120
70%—75 /	70%	60 /
240	1,500 (including dyehouse and doubling)	850 (including doubling), whereof 500 weavers
1	* 2 (and 1 for dyehouse)	4
—	1	1 and an assistant
7	15	18
10 (9 on Saturdays)	10	11
14s—50s twist, 6s—60s weft Italian spinning American and Egyptian cotton	20s—60s twist 6s—60s weft 7 numbers twist and 9 num bers weft, single and two fold Italian spinning They dye all their yarn themselves	12s—40s twist 9s—44s weft single and doubled all dyed yarns their own spinning
Lunatic dunnets table kitha shootings, figures co de miquies repa satony uplus with selidnes	Women's dress goods also men's raised trouserings. They do all their own raising and finishing	Mostly women's dress goods also men's trouserings and zephyrs for men's shirts
In value 6,600—7,000 francs per week	200 000 pieces of 35 metres, = 900,000 kilos per year	13 000 metres per day
Home trade The firm has the cloth dyed and sells it finished to the wholesale houses	Mostly home trade They also export to the Levant direct and sell to shipping houses for South America	Mostly home trade

CHAPTER XV

BLEACHING, DYEING AND PRINTING

THERE are over 100 dyeworks and bleachworks in Italy, including those connected with cotton factories. Besides those attached to weaving sheds a good many works belong to spinning and doubling mills that sell special qualities of dyed and bleached yarns. In some of the smaller dyehouses hank dyeing and bleaching are done by hand, but in most independent dyeworks and in those attached to the larger factories the bulk of the yarn is dyed on hank dyeing machines, mostly of Italian make. A great deal of dyeing and bleaching is also done in cop dyeing machines on the perforated skewer system, most, if not all, of German make. In some works cheese dyeing and bleaching are carried on, Obermaier (Bavarian) machines being frequently used for this purpose.

Cloth dyeing and bleaching works sometimes employ as many as 600 operatives, and are generally larger than those that only dye yarns, though there are some large yarn dyeing works, and some large concerns bleach or dye both yarns and cloth. As a rule important dyeworks and bleachworks are carried on in every way as separate concerns, even though they belong to companies that also own spinning mills and weaving factories, whose product is sent to the works to be finished. It is the usual practice for firms which manufacture dyed woven fabrics to perform all finishing operations themselves including raising in the case of flannelettes or other cloths with a pile. Goods which are woven grey and

sent to a dyeworks or bleachworks, naturally undergo the final finishing process at the works. Most cloth dyeing works are equipped with mercerising machines, piece mercerising having achieved a position of considerable importance, a good deal of yarn mercerising is also done.

Most cloth dyeing machines are of Italian make, as are also some mercerising machines. Bleaching machinery, however, is imported largely from England, chiefly from Manchester and Bolton, whilst practically all finishing and most mercerising and raising machinery comes from Germany. Some raising machinery also is imported from France.

Most colouring materials must be imported, but bleaching powder is produced so largely that Italy not only supplies her own needs, but also does a large export trade. The value of the colouring materials manufactured in Italy in 1905 was fr 6,850,000, of which a large quantity was exported. The value of the imports of colouring materials was fr 28,000,000, of which fr 17,000,000 came from Germany.

Calico printing is of considerable importance and is carried on with great success. There are 17 printworks which possess altogether between 110 and 120 roller printing machines, while some of them have also perrotine machines, and there are also five works equipped solely with perrotine machines. The number of perrotine machines in work is about 45. In addition block printing by hand is carried on in some of these works, chiefly for the production of head shawls, similar to those printed in Glarus, which are largely worn by Italian peasant women.

The number of roller printing machines in 1890 was only 40, and of perrotine 30, while the total number of printing machines at work in 1876 was only 26, and whereas formerly Italy was dependent on foreign countries for the bulk of her supply of prints, she now exports

far more than she imports, as the following figures indicate —

	Imports in Quintals	Exports in Quintals
1885	31,655	65
1890	25,157	137
1895	11,379	3,501
1900	4,801	12,983
1901	4,201	15,124

The volume of exports has considerably increased since 1901 together with the growth in the productive power of the industry. The Italians produce for the most part cheap and medium qualities of prints, principally dress goods and flannelettes, and by means of producing comparatively few patterns and running their machines for long stretches on one pattern they are enabled to produce great quantities at a low cost. In the largest works the average weekly production per roller machine is nearly 40,000 yards, which is much above the English average. The principal customers, after the home market, are South America especially Argentina, the Levant and the Balkan States, and a small trade is done with South Africa, Australia, India and the Far East.

Italian imports of prints are now confined to high-class dress goods, principally from Great Britain and Germany, and special qualities of shawls and handkerchiefs from Switzerland. The following table shows the movement of imports from these three countries in recent years —

	Imports in quintals from		
	Great Britain	Germany	Switzerland
1885	14,976	4,222	2,801
1890	11,971	5,631	3,898
1895	5,343	2,535	2,150
1900	2,148	1,007	867
1901	1,861	1,147	577

All the roller printing machines are imported from Manchester or Germany. Each machine is tended by one printer and three or four back-tenter^s, and there is sometimes one additional man per machine to bring the colour from the colour-shop and take away the empty tubs. The most usual method of driving is by electricity, each printing machine being driven as a rule by a separate motor. Steam has to be largely used for dyeing processes and is often also used for driving parts of the machinery other than the printing machines.

CHAPTER XVI

COMMERCIAL ORGANISATION

SPINNERS for the most part buy their raw cotton through agents in Milan, Genoa and Venice. American cotton is also largely bought direct from New York and New Orleans export firms, and to some extent from Liverpool and Bremen. While most American cotton exporters are represented by agents in Italy, one or two large firms have their own branch houses. There is a large firm of cotton importers in Genoa selling American cotton in round bales, which are very popular with Italian spinners owing to the superior way in which they are packed and the consequent economy, as far less cotton is lost or spoilt than is the case when it is packed in the usual American style of bale. It is also said that in the round bale more cotton can be packed in a given cubic space, so that there is economy in transport.

Most cotton is bought *c i f* Genoa for Lombardy, Piedmont and Liguria, *c i f* Venice for Venetia, and *c i f* Naples or Salerno for Campania.

It has been decided by the principal firms to establish cotton stores at Genoa, Venice and Mestre (the station on the mainland opposite Venice), whence the raw cotton could be sent inland as required. In this case the cotton would be bought *f o b* Galveston or other American port. Owing to the different conditions that prevail, spinners buy cotton less frequently and in greater quantities than in England.

The buying and selling of yarn is conducted on very similar lines in Italy to those in Switzerland, manufacturers and shippers buying either direct from the

spinners or from agents in the large centres such as Milan and Turin. In the latter case the yarn is usually invoiced by the spinner direct to the buyer. Spinners export a good deal of yarn to the Levant direct, but the bulk of the export trade is done through agents and shippers.

The method of carrying on the cloth trade is something between that of England and Switzerland. There is a considerable concentration of business in Milan and in a less degree in Turin, where many of the principal firms of Lombardy and Piedmont respectively have either their head or branch offices and also in many cases warehouses, though manufacturers in such centres as Busto Arsizio, Gallarate, Intra, and so forth, usually have their offices and warehouses adjacent to the factory. The head offices of companies owning several factories are nearly always in Milan or Turin. There are also some firms which own factories in different parts of Liguria and Tuscany which have their head offices and in some cases their warehouses in Genoa. The headquarters of all the important cotton firms of Campania are in Naples.

In the principal towns of Italy there are large wholesale houses to the number of about 150. These houses buy either direct from the manufacturers and calico printers or through agents who represent them, and in their turn distribute to the retailers. As regards dyeing and bleaching, manufacturers of figured grey goods generally send them out to finishers and sell them to the home trade houses in the finished state, but plain cloths are bought by the wholesale houses in the grey state and sent out by them to be finished. This of course refers to the numerous cases where the manufacturing firm does not itself own finishing works. It is a common practice for manufacturers to employ travellers to visit customers, as in Switzerland.

With regard to export, manufacturers and calico

printers sell a great deal direct to the Levant, as the Mediterranean countries are easy of access from Italy, and it is not difficult to open direct relations with them. Many leading houses are represented by agents in Constantinople, Smyrna, Alexandria, and all the principal Levantine cities, and some makers of fancy goods and novelties are represented in London, Manchester and New York, where they are beginning to compete with English and American manufacturers. In Milan and Turin there are many agents who take foreign buyers round to the different manufacturers, from whom they receive a commission proportionate to the amount of the sales. The manufacturers look to the buyer and not to the agent for payment.¹ As regards South America and other distant markets, there is less direct selling, though some manufacturers are represented by agents at Buenos Ayres, with which a very large trade is done. Many manufacturers, however, will not export direct at all. The bulk of the export trade, other than that with the Levant, is done through shippers established in Milan and Genoa, and a large business is also done through shipping houses in Hamburg, Paris, London and Manchester.

¹ The exact contrary is the case in England.

CHAPTER XVII

LABOUR AND INDUSTRIAL ORGANISATION

SECTION I — *Classes, Number and Efficiency of Operatives*

Conditions of labour vary between those prevalent in England and those in Switzerland. In the large manufacturing districts the degree of skill attained by the workers is very high, this being the second generation of cotton factory operatives. But in the country districts where many of the new mills are situated, the population is of an agricultural type and consequently less adapted as yet to industrial conditions. In these districts many operatives are in the habit of leaving the factory in the summer months to work on the land, especially in the rice growing parts, where good wages are offered to labourers, men and women, during the few weeks of the harvesting season. Mills in more or less isolated villages are bound to submit to this inconvenience, as there is no reserve of labour to draw on, but millowners in some of the larger though not yet completely industrialised centres are beginning to combat the custom by refusing to take the workpeople back when the harvesting is over. Owing to the rapid growth of the industry there is an absolute deficiency of labour in many industrial villages, and in many agricultural villages where new mills have been built, the local population is not large enough to supply enough workpeople for them. In consequence of this, it is very common for millowners to build boarding-houses for operatives, usually girls, similar to those of Switzerland but on a larger scale owing to the greater size of Italian mills.

Perhaps the majority of the inmates of these houses come from the surrounding country and go home for week-ends but many come from considerable distances. The chief disadvantage of this system is that when the girls get married, it is usually to men from their own district, so that they go home and leave the factory. In order, therefore, to secure a more permanent class of labour many factory owners build cottages in the village, which they let to families some of whose members work in the factory. When the whole family settles in a neighbourhood, it becomes a permanent instead of merely temporary place of residence for the operatives, the girls marry and settle down there, and a new generation of factory workpeople will grow up.

The number of people engaged in the cotton industry, including all classes of operatives, was as follows —

in 1900	135,198
„ 1903	138,880
„ 1905	149,113

The 138,880 operatives employed in 1903 were distributed according to age and sex in the following manner¹ —

<i>Over 15 years</i>		<i>Under 15 years</i>	
Male	Female	Male	Female
34,335	82,056	4,739	17,750

According to returns relating to 38,238 female cotton operatives over the age of 15, made to the Italian Labour Department in 1903, the proportion of married women was 23.9 per cent.² According to the Summary of Returns of Persons employed in 1907 in Textile Factories in U.K., issued by the Home Office in 1909 [Cd. 4692], there were 106,011 unmarried, 44,399 married,

¹ See 'Riassunto delle Notizie sulle Condizioni Industriali del Regno, issued by the Ministry of Commerce (Statistical Department), Rome, 1906.

² See "La Donna Nell'Industria Italiana" issued by the Ministry of Commerce (Labour Department), Rome, 1903.

and 5,430 widowed women out of a total of 155 840 women cotton operatives over the age of 18, with respect to whom returns were made

In the manufacturing districts a great number of men whose wives or daughters are employed in the cotton factories are employed in industries, such as that of engineering, which flourish side by side with the cotton industry. In rural districts many men are employed on the railway, in quarries, and so forth, but the majority are occupied in agriculture. Many are small tenant-farmers, a large proportion of whom hold on the metayer system, many are agricultural labourers, especially in the Lombard plain, and some, especially in Piedmont, are peasant proprietors. Generally, where there are no factories the women as well as the men work on the land, and the growth of industry with its demand for both male and female labour has had a marked effect on agricultural wages, which have risen rapidly of late years in the districts which are becoming industrialised, while the families of the small metayer farmers and peasant proprietors gain considerably in comfort from the wages brought home from the factory.

The North Italian operatives are hard working and intelligent, and in the manufacturing districts where the industry has been established for a generation or more, the workpeople are quicker and cleverer at their work than the Swiss cotton operatives, though not so tidy and careful, and the people employed in the Lombard and Piedmont factories are as a rule of a superior class to the emigrants who find work in the cotton factories of Switzerland. Still even in Lombardy the cotton operatives as a class are distinctly less efficient than those of Lancashire, as is but natural considering that the industry is of so much more recent growth. They are also less disciplined, and consequently the number of overlookers is in excess of the standard usual in Lancashire. This is largely due to the amount of

raw labour that has to be enrolled, and will no doubt diminish in the future

The usual proportion of labour to machinery in the various operations of an Italian spinning mill is as follows —

- Opening 1 man per opener
- Scutching 1 man per 1 intermediate and 1 finisher
scutcher
- Carding 7 to 9 engines per man (including grinders
and strippers)
- Drawing 1 girl per frame of 3 heads and 4 to 6
deliveries, 3 or 4 girls per 2 frames of 3 heads and
7 or 8 deliveries
- Fly frames 1 slubbing, intermediate or roving frame
per girl, 2 Jack frames per girl
- Ring frames usually 2 or 3 sides per girl, occasionally
4 sides per girl, young girls often mind only
1 side ¹
- Mules 1 spinner, 2 piecers (1 big and 1 little) and
2 creelers (boys) per pair of 800 to 1,000 spindles
each

The proportion of labour to machinery in Italian weaving sheds is as follows —

- Cop Winding 20 to 40 spindles per girl
- Hank Winding 15 to 20 spindles per girl
- Beam Warping 1 woman per machine
- Sizing 1 sizer and 1 helper per slasher, 1 sizer per
Scotch dresser machine
- Drawing 1 woman drawer and 1 girl reacher per
frame
- Weaving 2 looms per weaver (women)

The number of looms per tackler varies according to the kind of loom and the class of work done In grey cloth

1 One may reckon about 200 spindles per side.

sheds there are from 50 or 60 up to 100 looms per tackler, often with a warp gaiter or a boy to help. There are usually about 80 looms per tackler. In coloured goods sheds there are usually 50 to 60 looms per tackler, including dobby and Jacquard looms, generally with a warp gaiter or boy helper. There are from 55 to 65 Northrop looms per tackler on an average.

SECTION II — *Management*

In the case of a spinning mill and weaving shed being run together, there is generally one manager for the combined concern, with an inside manager each for spinning and weaving, and also one for the dyehouse or bleachworks where there is one. However, occasionally there are a head overlooker of the weaving department and a head overlooker of the weaving preparation department, both directly responsible to the manager. In large spinning mills there is sometimes an assistant inside manager.

In the case of independent spinning or weaving factories arrangements vary according to circumstances. If the concern is a private one, a member of the firm usually manages it with an inside manager under him. If the factory belongs to a company there are usually a manager and under-manager if it is a large one, but only a manager, to whom the overlookers of the different departments are directly responsible, in the case of smaller concerns. Sometimes if a firm or company owns a number of small or medium-sized factories, there is an inside manager of each, with a manager exercising a general supervision over all of them.

In the case of companies the functions of technical and commercial manager are distinct, and this is the case also in at-any-rate the larger private concerns.

The number of overlookers in spinning mills varies considerably. Perhaps in an average mill of 30,000 spindles there would be one overlooker and one assistant

for spinning and the same for preparation, and in larger mills there would be two overlookers for spinning and two or three for preparation, or perhaps an overlooker and two assistants for spinning and the same for preparation. Where there are both mule and ring spinning in the same mill there are often one overlooker for the mules and one for the rings. In many mills the number of overlookers is in excess of the above figures, but there is usually some special reason for this. Of course, where double shifts are worked the overlookers must be proportionately increased but apart from this the nature of the work or the class of operatives employed may necessitate a more than average number of overlookers. Thus in mills that have gassing and doubling departments there is an overlooker of each of these, and there is also an overlooker of the reeling department, where much reeling is done. A transitory reason why some old-established mills have an unusually large number of overlookers is that they retain a number of men who have been in their service many years and who owing to the advance made by the operatives are not really necessary any longer, though they were so 12 or 15 years ago.

In weaving factories there are usually one weaving shed foreman overlooker and one overlooker of preparation, the latter of whom sometimes and the former rarely has an assistant in the case of large factories. In many coloured goods factories, especially those where many varieties of yarns are used, there is an overlooker of each preparation department. This on the whole is similar to what obtains in good English factories.

In the higher grades of the industry the standard of education and technical ability is much higher than in England. There are technical schools with textile departments in Milan, Bergamo, Biella, Turin, Prato and Naples, whose students are in great request for posts in factories. Many students after completing the course

at one of these schools pursue their studies in Technical High Schools (of university rank) in Italy or Germany and take a full engineer's diploma and many take a course of study in the Manchester School of Technology. Furthermore, it is a common practice for factory owners' sons or those who aspire to be managers, to complete their training by working in a mill or textile engineering works in England, America, Germany or Switzerland. Men who intend going into the dyeing or printing industry often complete a scientific chemical education by working in a colour shop or printworks in Germany. The conditions of the industry offer excellent openings to well-trained young men, as the companies and large firms that own several mills frequently have vacancies to fill, so that a man who gets a post as assistant-manager in a factory may be subsequently appointed by the company manager of one of its smaller mills. He then has the chance of being transferred to one of the company's larger mills or of getting an appointment with another firm.

The growth of the industry has stimulated the demand for highly-trained men, especially as managers of fancy weaving factories who are paid high salaries, but it is only within recent years that an adequate supply has been obtainable in Italy, as the industry is so young in that country. Therefore, a great number of Swiss were appointed to positions as managers and inside managers, especially in those factories that are owned by Swiss, and many of the overlookers in these factories are also Swiss. Many of the managers are former students of the Wattwyl Weaving School, who have been attracted to Italy by the salaries offered, which are, in the case of managers of large factories, much higher than they could obtain at home. Some factories where a great number of Swiss are employed provide schools with Swiss teachers, where the children can be taught German and their own national history and literature. But where

Swiss managers are employed in Italian owned mills, the overlookers are Italian, and the managers' families being isolated from their countrymen, the children tend to grow up with Italian manners and merge in the general population. There are still many Swiss managers of Italian factories, but as an increasing number of Italians train themselves for this calling, the proportion of Swiss employed is diminishing.

CHAPTER XVIII

SOCIAL CONDITIONS

SECTION I — *Housing*

Italian operatives in the towns usually live in two-room¹ tenements, but both one room and three-room tenements are common, while four-room tenements are very rare. The bulk of the tenements are in large blocks, and it is most unusual for a town workman to occupy a separate house. While this system adds to the dignified appearance of the streets, especially in new quarters of towns where the roads are wide, it is inferior to the English system of separate houses in point of the privacy and comfort of the inhabitants. In compensation for the inferior accommodation house rent is very much lower in Italy than in England, though it varies from town to town.

According to the results of an enquiry made by the Società Umanitaria in Milan in 1903 (quoted from "L'Italia Economica," 1907) the rents paid by 49,134 working-class families varied from fr 70 to fr 225 a year, the rents of 77 per cent of the dwellings falling within the limits of fr 70 and fr 120 a year, or 1/1 and 1/10 a week, but rents have risen since then.

The following table (taken from the "Bollettino del Lavoro,"¹ quoted from the British Consular Report on Lombardy for 1908) gives particulars of yearly house rents in 1906 at four cotton manufacturing towns of Lombardy —

	One Room	Two Rooms	Three Rooms
Brescia	fr 50 to fr 70	fr 100 to fr 150	fr 150 to fr 240
Busto Arsizio	fr 40 to fr 60	fr 70 to fr 120	fr 120 to fr 200
Legnano	fr 50 to fr 70	fr 100 to fr 140	fr 150 to fr 210
Monza	fr 65 to fr —	fr 120 to fr 150	fr 175 to fr 235

In typical cotton manufacturing towns in Piedmont

1 Labour Gazette, issued by the Italian Labour Department

rents of workmen's tenements vary from $3/2$ to $4/9$ per room per month, so that a two-roomed dwelling would cost $1/7$ to $2/4\frac{1}{2}$ per week. Better-class dwellings, such as those that would be occupied by superior artisans and foremen, let at $5/6$ to $7/-$ per room per month.

In order to cope with the overcrowding in the towns, evidenced by the number of one-room tenements, some municipalities have built model workmen's tenement dwellings, for example, the municipality of Venice, where workmen's rents are higher than in any other town in Italy, has built dwellings which it lets at a rent of from $9/6$ to $12/-$ per month, including the water supply. The Società Umanitaria has built several tenement dwellings in Milan, where overcrowding is extremely pronounced, and in most of the provincial towns of Italy there are co-operative building societies, whose growth has been stimulated by a law of 1903 authorising the Savings Banks to advance loans for the construction or purchase of workmen's houses, and charitable foundations to invest a portion of their capital in them.

In rural districts and country villages the position is rather different. Here again accommodation is bad but rents are low, a labourer's cottage costing about £2 a year. But municipal or co-operative effort cannot be relied on to supply deficiencies in housing accommodation, so that manufacturers in need of labour have had to tackle the problem themselves.¹ The houses built by the manufacturers are generally rows of cottages very similar in style to those met with in such a town as Bolton, and much superior to the ordinary Italian labourer's dwelling, and there are often small gardens in front of the cottages. These houses are let at very low rents, in some cases as low as fr 1 50 per room per month, or about 10d per week for a three-roomed house.

¹ Cf. p. 182. Some workmen's cottages have recently been built by cotton manufacturers in Busto Arsizio.

SECTION II — *Mill Boarding-Houses and other Facilities
provided by Millowners*

It has hitherto been more usual for manufacturers to build boarding-houses than cottages for their work-people. Many of these houses are large, several having accommodation for 300 or 350 girls, while houses with as many as 600 girl boarders are not unknown. The houses are conducted by Roman Catholic sisters and are usually airy, clean and comfortable, and lighted by electricity. The girls sleep in dormitories, each one having a separate bed and a locker for her belongings. Meals are taken in common dining rooms, and common sitting rooms and sometimes also recreation rooms are provided. The diet is generally plentiful of the kind common in Italy, but meat is not as a rule provided except on Sundays and Saints Days. An average day's diet is as follows: for breakfast, bread and chocolate or broth, for dinner, rice, broth and bread, or minestra, vegetables and bread, or polenta, broth and bread, for supper, minestra or polenta. Very often the girls who go home for the week-end bring back with them home-made cakes or other dainties, which they share with the other girls in the evenings.

A usual charge at these boarding-houses is 35 or 40 centimes a day inclusive. At some where the diet is slightly more varied 60 centimes a day are charged, or inclusive of wine 65 centimes. These charges are considerably lower than those of similar Swiss boarding-houses, where, however, meat is more frequently provided.

In the factory towns the operatives who live at home usually go home for dinner, as the dinner interval lasts an hour and a half or two hours. But in many factories the workpeople take their dinner on the premises. In an hour and a half or two hours. But in many factories for warming their food are provided. Sometimes these

arrangements are very elaborate, well equipped kitchens, and dining halls being provided. Occasionally these are managed by the operatives, though provided by the firm. In rare cases dinner is provided free for the workpeople but this is usually in country mills in Southern Italy, where the money wages are low.

It is fairly common for the workpeople to take something to eat at the factory during the morning, and sometimes also in the afternoon. This they take while the machinery is running, and it is not as a rule food that needs warming, being usually bread and cheese or sausage, frequently with wine to wash it down.

Wash basins are always provided, and in many of the larger factories there is excellent cloakroom and washing accommodation. In a few factories bath-rooms are provided for the use of the operatives. This convenience is occasionally found also in Switzerland and Vorarlberg.

Some manufacturers whose mills are in rural villages have founded "asili infantili" where mothers can leave their children under six years of age, while they are at work. These institutions partake of the nature of infant schools and of crèches, and are often taken advantage of by women other than those employed in the factory. They are highly appreciated where they exist, as the school age in the public elementary schools only begins at six years. One firm that attracted a great influx of population for whose children there was insufficient school accommodation in the village, built and staffed a free school for 500 children. But this is somewhat exceptional, and is not often necessary in the North, though in the South the provision of schools is very deficient.

Clubs have been founded in some villages by large manufacturers, and are usually open to all the inhabitants and not merely to the firm's employés. The attractions provided include bowling greens, billiards, gymnasia, small theatres, and refreshment bars.

SECTION III — *Standard and Cost of Living* ¹

The standard of living of Italian cotton operatives is low in comparison with that of Lancashire, and lower on the whole than that of Swiss workpeople. But the standard of the best class of Italian operatives is distinctly higher than that of the poorer operatives in the rural parts of Switzerland. The diet varies somewhat from district to district and between town and country, but there is a strong general similarity throughout Northern Italy. Breakfast usually consists of bread with cheese or "salami" (salt meat) or sometimes broth, dinner of minestra (macaroni, pulse or rice cooked with lard or oil, occasionally with the addition of a little chopped meat or grated cheese), or sometimes bread and cheese with potatoes and green vegetables or fruit, supper of polenta (a preparation of maize or other grain or ground chestnuts) and milk, or minestra, sometimes with the addition of bread and "salami". The most usual beverage is wine, which is freely drunk in Piedmont and Tuscany, where it is cheapest. Coffee is also drunk by the working classes, but much less frequently than by the middle classes, and it is by no means such a favourite drink with Italian as with Swiss workpeople. While a good deal of "salami" is eaten by Italian workpeople, fresh meat is comparatively rarely eaten. In the towns it is usual to have beef or pork for dinner on Sundays, but in the country fresh meat may not be tasted except on special holidays, on the other hand some of the superior workmen in Turin and also in Milan and the surrounding towns have meat oftener than once a week, and its consumption is increasing. In the South less grain food is eaten than in the North, but more vegetables and fruit. In Lombardy and Venetia a great deal of maize bread is eaten by the working-classes, and also rye and barley bread, though wheaten bread also is eaten. In Piedmont

¹ Cf. King and Okey, *Italy To Day*. New Ed. pp. 128-133, 141-142, 374-375. The authors exaggerate the effects of the corn duty.

and Tuscany wheaten bread is the staple kind, though a large amount of rye bread and maize bread is consumed. It will be observed that while the diet is mainly vegetarian, it is satisfying and fairly nutritious, and there is no doubt that the vitality of the people is high.

Prices of foodstuffs are much lower than in England or Switzerland, with one or two exceptions, the most striking of which are salt and sugar, which are heavily taxed and therefore dear. The best wheaten bread is dearer than in England, though not dearer than in Switzerland, but bread made from mixed cereals is about equal in price to second quality wheaten bread in England.

The following list shows the prices in six industrial towns of some of the articles generally consumed by the working-classes. The particulars regarding Milan are quoted from the British Consular Report for Lombardy for 1907, and relate to the average prices during that year. The particulars regarding the other five towns are quoted from the "Bollettino del Lavoro" and relate to the prices current in February, 1907.¹

		BERGAMO	MILAN	MONZA	NOVARA	PISA.	TURIN
		Centimes.	Centimes.	Centimes.	Centimes.	Centimes.	Centimes.
Bread (wheat)	Per kilo	40	38/48	37/40	31	23/33	32
" (mixed cereals)		28	—	34/35	27	—	—
Rice		35	41	38/42	25 (per h.)	42/50	44
Macaroni, etc		43	60/75	48/55	50	48/51	52
Potatoes	"	11	10	10	15	10/20	12
Beef		120	105/230	120/140	136	120/165	—
Pork		145	80/120	120/130	100	90/160	—
Milk	litre	20	25	20	15	30	25
Cheese	kilo	—	250/320	—	—	—	—
Butter (fresh)		—	280	—	—	—	—
Eggs	doz.	—	120	—	—	—	—
Lard	kilo	—	175	—	—	—	—
Oil	"	—	120/225	—	—	—	—
Wine	litre	—	50	—	—	—	—
Coffee	kilo.	—	320/435	—	—	—	—

¹ The prices are given in centimes per kilo or per litre. 10 centimes = slightly less than 1d., 1 kilo = nearly 2½ lbs. 1 litre = over 1½ pints, or nearly 1 quart.

The price of cheese in Milan, from about 11d. to 1/1 per lb., seems much above the average, for cheese can be bought considerably cheaper in many parts of Italy.

Owing to the octroi system, by which the municipalities raise a large revenue, prices are higher in the towns than in the country.

The prices of most foodstuffs have diminished during the last quarter of a century, as have also those of articles of clothing, the average prices of cotton cloth fell between the periods 1879—81 and 1901-3 by 34 per cent or 35 per cent, and the prices of woollen cloth by about 13 per cent, and the average reduction in the prices of the most general articles of consumption during that period was between 22 per cent and 23 per cent ¹

As regards clothing the differences in taste and climate between England and Italy make comparison difficult. Probably Italian factory women are as well dressed on the whole as English, in fact, they appear tidier and better dressed at their work, though they are perhaps inferior in this respect to the Swiss. Italian workmen, however, are quite as ill dressed at their work as English workmen, and they are not so well dressed on Sundays and holidays. Italian working people always dress after the fashion of their own class and do not imitate middle-class styles.

With regard to the cost of clothing, high-class woollen and worsted goods are dearer than in England, but low-class woollen goods and mixed woollen and cotton goods are cheap. Italian workpeople wear many articles made of cotton which would be made of wool in England, and the prices of these are very low. On the whole it may be said that Italian workpeople are tolerably well clothed at a moderate cost, but they do not possess anything approaching in quality the best clothes of Lancashire workpeople, and if they wanted such articles, the cost would probably be prohibitive.

SECTION IV — *Co-operative Stores and Thrift Agencies* ²

Co-operative stores are very common in the manufacturing districts of Italy and, as regards those patronised

¹ These figures are taken from *I Italia Economica*, 1907, p. 435. The price of wheat has been high in the last two years owing to disappointing harvests.

² Cf. King and Okey, *Italy To Day*, New Ed. pp. 193-208, 210-212, 217-220, 376-377, 378.

by the operatives, are usually small local societies, whose membership is confined to the working class, though some have developed into large and important undertakings. In large towns such as Milan there are generally several separate stores. Although there is a National League of Italian Co-operative Societies, which includes all manner of societies and not merely stores, and there are a few provincial federations, the local societies maintain a high degree of independence. They play a large part in working class life and have done much to enable their members to obtain commodities at low prices. They are entirely due to working class initiative and have not been founded or subsidised by manufacturers for the benefit of their employes as sometimes happened in Switzerland. As Lancashire leads in the co-operative stores movement in England, so Piedmont and Lombardy, the principal seats of the Italian cotton industry, are foremost in consumers' co-operation in Italy.¹

There is a great number of friendly societies, especially in the North, and indeed it was the friendly societies of Piedmont that first established co-operative stores in Italy. Some of the friendly societies still have stores attached to them, but as the co-operative movement has developed on independent lines, the friendly societies have mostly confined themselves to the payment of various kinds of benefit, principally sick and funeral benefit. Some pay also old age and chronic invalidity pensions, and a few pay unemployed benefit, but the majority are too small and not sufficiently wealthy to undertake more than the usual sick and funeral benefit. The regions with the greatest number of societies and members are Lombardy and Piedmont, while Venetia and Tuscany also stand high. Recent statistics show that the income of all the societies in 1904 was

¹ For a fuller account see Fay "Co operation at Home and Abroad" Commare also Chapman "The Lancashire Cotton Industry" p 281

fr 15,307,769, their expenditure fr 12,435,091, and their total capital, fr 78,536,665, or more than £3,140,000. Of the 6,535 societies existing in 1904, about a quarter had a membership of between 100 and 200, but the total membership was about 950,000. There are some friendly societies composed of the operatives of a single factory, and in such cases the firm often contributes to the funds and shares in the management. These societies generally confine themselves to the payment of sick benefit.

For Old Age and Chronic Invalidity there is a system of voluntary insurance assisted by the State.¹ A National Fund was founded in 1899 with a capital of £400,000, and an annual contribution is made by the State. All manual workers can insure by paying premiums of not less than fr 6 (4/9) or more than fr 100 (£4) per annum, and all the insured receive an equal annual bonus. The pensions of men begin at their option at the age of 60 or 65, and those of women at 55 or 60, provided they have been insured for at least 25 years. Workpeople who are over the age of 35 or 40 when they begin to insure will have the right to a pension on reaching pension age, provided they have insured for at least 10 years and pay each year in addition to the ordinary premium one franc for each year by which the normal period of 25 years is fallen short of. The amount of the pension varies according to the duration of the insurance and the amount of the premiums. A person may insure in two categories, in the one, if he dies before beginning to enjoy his pension his premiums accrue to the Fund, in the other, they are returned to his wife, children or parents. Those who insure in the second category receive a smaller pension. If a person has paid premiums for five years, then in the event of his becoming permanently incapacitated by

¹ Under a law of 1907 embodying the provisions of a law of 1898 and subsequent amending statutes.

illness or accident, his pension begins at once, whatever his age may be. And if the pension be insufficient, provision is made for increasing it out of special funds destined for that purpose.

Special terms are given to friendly societies that insure their members with the Fund in mass, and some friendly societies do so, though it is more usual for workpeople to insure individually. Many cotton manufacturers help their employes to pay their contributions, or even pay the whole premium for them, in addition to assisting them to maintain a friendly benefit society.

Savings Banks of two kinds flourish in Italy, the ordinary Savings Banks and the Post Office Savings Banks, the latter of which are created and administered by the State, while the former are created and administered by the communal councils or other local authorities, but subject to the inspection and control of the State. The total deposits, the bulk of them those of industrial operatives, agricultural labourers and small peasants, amounted in 1906 to the large sum of 3,168 million francs or £127,000,000, of which 1,957 million francs were deposited with the Savings Banks and 1,211 millions with the Post Office Banks. Many artisans also have investments amounting to very considerable sums in the People's Banks, which are joint-stock concerns managed by committees elected by the shareholders. These do a large deposit business, they finance industrial and agricultural undertakings, make advances to co-operative productive and labour societies, and so forth. Over half the funds of the ordinary Savings Banks are invested in public securities, more than 300 million francs are invested in mortgages, and an equal amount in bills of exchange, and other banking business is done. Vast numbers of depositors are drawn from the cotton manufacturing districts, especially of Lombardy, but there is no information as to how large a share the cotton

operatives have in the deposits, though it must be considerable ¹

A form of workmen's investment common in Lancashire, namely, buying shares in spinning companies, is not known in Italy,² though there are one or two cotton factories owned and conducted by co-operative societies. These, however, do not form at all an important feature of the industry.

1 The above figures are taken from an article in *L'Italia Economica*, 1908 by *Avvocato U. Aillaud* of the Department of Credit and Thrift in the Italian Ministry of Agriculture, Industry and Commerce. According to King and Okey *loc. cit.* the deposits in the Post Office Banks in 1908 were 59½ millions sterling, in the ordinary Savings Banks and credit societies 114 millions and in the People's Banks 38½ millions.

2 It is however common for operatives to hold shares in hat manufacturing concerns of which there are many in Monza, the shares being generally smaller than those of cotton spinning companies.

CHAPTER XIX

WAGES

SECTION I—*Spinning*

Wages are paid in cash usually every fortnight. Saturday is the most common pay-day, but wages are paid on other days by some firms.

In spinning mills workpeople are generally paid by piece rates, except blowing room operatives and cardroom strippers and grinders who are paid by time. The following table shows the wages of the different classes of spinning operatives —

	Francs per day			Shillings per week.
	Min	Max	Average. ¹	Average ¹
Mule spinners	3 50	5 00	4 00—4 50	19/3—21/7
Big piecers ²	2 20	3 20	2 50—3 00	12/-—14/5
Little piecers	1 50	2 30	1 50—1 60	7/2—7/8
Creelers	0 80	2 45	1 20—1 30	5/9—6/3
Ring spinners	1 20	2 50	1 70—1 80	8/2—8/8
Fly frame				
operatives	1 50	3 00	2 00	9/7
Drawing frame				
operatives	1 40	2 20	1 70—2 00	8/2—9/7
Cardroom grinders	2 50	5 00	3 00	14/5
Cardroom strippers	2 00	2 75	2 20—2 50	10/6—12/-
Blowing room				
operatives	2 00	3 00	2 50	12/-

Overlookers are paid fr 5 or fr 6 per day.

The above particulars relate entirely to Northern Italy. In the South wages are much lower, spinners earning

1. Average is here used to mean general or prevalent.

2. Very often both piecers are men, each earning fr 2 50 to fr 3 00 per day, and there is no little piecer.

about fr 3 per day, big piecers about fr 2 and drawing frame and fly frame tenters about fr 1 to fr 1 20 per day, the maximum being about fr 1 50. Ring spinners usually tend only one side of a frame and earn about 90 centimes per day, but some tend two sides and earn fr 1 20 or fr 1 30 per day.

Even in the North the wages of all operatives except mule spinners are lower than in Switzerland, particularly those of female operatives, Italy resembling England in the lowness of women's wages compared with men's in the spinning industry, though Italian wages are very much lower than English in both cases.¹

In the more important centres of the industry rates of wages have been informally agreed upon in some cases by the employers and workpeople of the district, but in those parts where there is less concentration, each firm has its own list. On the whole, the variations in the rates of wages are not very great, though there are differences between district and district, corresponding to variations in local conditions. The principal variations naturally occur between the rates paid in remote districts and those paid in industrial centres, where the higher standard of living and the greater opportunities for organising the workpeople combine to raise the rates above those paid in isolated mills. The millowners have the advantage of a steadier and more efficient supply of labour in return for the higher wages. The highest wages are paid in Lombardy and Piedmont, which possess the six provinces in which the spinning industry is most concentrated. These provinces are, ranking them according to the general level of wages in each, Turin, Milan, Bergamo and Novara, Como and Brescia.

Although wages in the Italian spinning industry are low in comparison with Lancashire wages, they are much higher now than they have ever previously been,

and the advance has been most marked in recent years. There are not sufficient data to measure the increase exactly, but there are enough to show that it is very great. In the "Annali di Statistica—L'Industria del Cotone,"¹ the movement in wages in two representative firms, one in the province of Milan and the other in the province of Genoa, is shown for the period 1871—98. In the case of the Milanese firm the rise shewn in the average daily wages of men spinning operatives is from fr 1 60 in 1871 to fr 2 10 in 1898, and in those of women spinning operatives from fr 0 60 in 1871 to fr 1 29 in 1898. In 1904 there was a further increase in men's wages to fr 2 22 and in women's wages to fr 1 62. In the case of the Genoese firm the maximum wages of men spinning operatives were fr 3 20 per day in 1871 and fr 3 50 per day in 1898, and the maximum wages of women were fr 1 00 per day in 1871 and fr 1 50 per day in 1898.

The statistics published in "La Donna Nell' Industria Italiana"² show that in 1903 of the women over 15 years of age employed in spinning mills 60 per cent were earning between fr 1 00 and fr 1 50 per day, 25 per cent were earning up to fr 1 00 and only 14 per cent between fr 1 50 and fr 2 00, while less than 1 per cent were getting over fr 2 00. If the South were excluded, the proportion earning less than fr 1 00 would be considerably reduced, while the proportion earning between fr 1 50 and fr 2 00 would be increased, but still the majority would only be earning between fr 1 00 and fr 1 50 a day, whereas now the majority earn between fr 1 50 and fr 2 00, the former being, indeed, an exceptionally low figure, while many women earn considerably more than fr 2 00 per day. According to

1 Issued by the Statistical Department of the Ministry of Agriculture, Industry and Commerce (Rome 1902)

2 See p 182, n 2

the calculations of Geisser and Magrini¹ the ratio of the increase in nominal wages in the textile industry between 1862 and 1903 was from 100 to 183, while the increase in real wages, taking into account only the price of grain, was from 86 to 181 or 110 per cent

The increase in average earnings is largely due to increased efficiency, workpeople tending more machinery now than formerly, and the production per machine being greater. But the rapid advance since 1903 was brought about by a series of strikes in 1905 and 1906, which affected the whole industry in the provinces of Turin and Milan and all round Lago Maggiore. Among other concessions gained by the strikers were substantial increases in wages for all classes of cotton operatives in those districts. In 1906 wages were increased in Tuscany after friendly negotiations between masters and men, and in the next year there was a general advance in the rates of wages in Bergamo and other parts of Lombardy. Thus, even in those districts that escaped the strikes, it was found necessary to raise wages to preserve good relations with the workpeople, whose position is now so strong that during the recent depression in the cotton trade there have been no reductions in wages.

SECTION II — *Weaving and Related Industries*

In weaving sheds most operatives except sizers are paid according to piece rates. Tacklers are in most cases paid by the month, but sometimes they receive a fixed weekly wage plus a premium reckoned according to the production of the looms under their charge.

The wages in the different departments of the weaving branch of the industry are shown in the following table

¹ Contribuzione della storia o statistica dei salari industriali in Italia nella seconda metà del secolo XIX, by A. Geisser and E. Magrini, Turin, 1904, quoted from *L'Italia Economica*, 1907, p. 428.

	Francs per day			Shillings per week
	Min	Max	Average ¹	Average ¹
Winders (girls)	1 00	2 20	1 50—1 80	7/2—8/8
Warpers (women)	1 80	3 00	2 00—2 50	9/7—12/
Sizers (men)	3 50	6 00	4 00—5 00	18/3—24/
Helpers (men)	2 00	3 50	2 50—3 00	12/ —14/5
Drawers (women or girls)	1 25	3 00	1 70	8/2
Reachers (girls)	0 55	1 40	—	—
Grey cloth weavers				
2 looms (women or girls)	1 20	3 70	1 80—2 10	8/8—10/1
Coloured cloth weavers				
2 looms (women or girls)	1 70	4 20	2 20—2 30	10/8—11/1
Tapestry (Jacquard) weavers				
1 loom (men)	3 00	4 00	3 50	16/10
Loom Tacklers (men)	4 00	10 00	6 00	28/10

Girl learners are often employed at winding or weaving at a day wage of fr 1 00 to fr 1 50, and sometimes at winding or reaching-in at a day wage of 55 centimes to fr 1. Weavers who tend three plain looms generally earn from about fr 2 30 to upwards of fr 3 00 per day.

Women's wages are higher on the whole in weaving sheds than in spinning mills, Italy resembling England and differing from Switzerland in this respect. Men's wages are fairly similar in Swiss and Italian weaving sheds, but women's wages are lower in Italy than in Switzerland ².

The wages of weaving operatives have risen in a similar proportion and under the same circumstances as those of spinning operatives, the close connection between the two branches of the industry causing movements of wages in both to be as a rule synchronous.

The following particulars will indicate the extent of the advance that has taken place —

At the Milanese and Genoese factories mentioned on p 203, there are weaving sheds attached to the spinning mills. In the Milanese factory the average daily wages of female weaving operatives were fr 0 80 in 1871 and fr 1 66 in 1898. In the Genoese factory the maximum wages of men operatives were fr 3 00 per day.

¹ Average is here used to mean general or prevalent

² Cf pp 92 93

in 1871 and fr 3 50 per day in 1898, and the maximum wages of female operatives were fr 1 20 per day in 1871 and fr 2 00 per day in 1898

Of the women over 15 years of age employed in weaving sheds in 1903, 45 per cent were earning between fr 1 00 and fr 1 50 per day, 28½ per cent were earning between fr 1 50 and fr 2 00, 8 per cent were earning more than fr 2 00, and 18½ per cent were earning less than fr 1 00 per day. These wages are low compared with those prevalent at the present day, when fr 1 50 is an uncommonly low wage, and the number of women earning over fr 2 00 per day is very considerable.

The wages of hand weavers employed by entrepreneurs are fairly high, as wages go in Italy, which is due to the fact that they are mainly employed in the manufacture of specialities. In Monza men hand weavers earn on an average fr 2 50 a day, and women hand weavers fr 2 10. In Pisa the average wages of hand weavers are fr 2 per day, but fr 3 per day is not an uncommon wage, while there are men weaving fancy cloths who earn as much as fr 4 per day. Wages of hand loom weavers are highest in Chieri. The men who work in the factories at Jacquard looms earn on an average fr 3 50 per day of 10 hours, while the best sometimes earn as much as fr 5 00. The usual wages of the hand weavers who work at home are from fr 2 to fr 3 50 a day, according to the number of hours worked, men as a rule earning more than women. The average earning capacity of home weavers in this district is 25—30 centimes an hour, which is rather higher than in Appenzell.

The above remarks apply only to professional hand loom weavers. Many people, peasants in particular, weave only as a secondary occupation, and their earnings from this source are very irregular, averaging in some cases no more than 20 centimes a day, as many a day may pass without the loom being touched. The earnings of the domestic weavers, mostly women, in

Campania, where the industry is not organised as it is in the North, and where the weavers usually possess their own looms, are very variable and much lower than the average wages given above

The workpeople in bleachworks, dyeworks and printworks are usually paid by time. In bleachworks and dyeworks ordinary workmen are generally paid about fr 2.50 a day, but more skilled men are paid up to fr 3.50 a day, and in some of the newest and finest bleachworks the latter amount is the average wage.

The average wages of printers tending roller machines are fr 6.00 a day, the minimum being about fr 4.50 and the maximum about fr 7.00. Back tenters are paid about fr 2.50—3.00 and upwards.

Perrotine printers are paid fr 3.00—3.50 a day, and block printers earn about the same.

CHAPTER XX

FACTORY LEGISLATION

*Protection of Women and Children
and Insurance against Accidents*

The principal provisions for the legal regulation of factory conditions are contained in the Law of 1907 on the Labour of Women and Children, embodying the provisions of the Law of 1902 as amended in 1907, and in the Law of 1904 on Workmen's Accidents, which embodies the provisions of a law of 1898 and an amending law of 1903. These laws lay down the broad conditions that must be observed, and empower the executive to issue special Orders for their detailed execution. Both laws direct that written notice of the occupation of a factory, together with certain prescribed particulars, must be served on the authorities of the district.

By a law of 1907 a full day's holiday in each week must be allowed to all workpeople, and in cotton factories the day allowed is Sunday. In addition, the principal Church holidays are observed by all factories. There is some difference between the several districts as to the number of holidays, some days being observed in one place and not in another. Twelve to fifteen days a year, in addition to Sundays, would probably be the number of holidays kept throughout the industry.

Certain provisions, similar to those of the English Factory and Workshop Act, 1901, regarding ventilation, cleanliness, sanitary conveniences, and other matters, the object of which is the preservation of health and decency, form part of the Italian Law on the Labour of Women and Children, and so would not be applicable

to factories where only men are employed¹, but as women are employed in all cotton factories, so far as they are concerned the Italian law is practically the same as the English in these respects. No special mention is made in the Italian law about humidified cotton factories, but general provisions against permitting vitiation or excessive dampness of the atmosphere enable the authorities to secure that hygienic conditions are maintained, and as a matter of fact Italian cotton factories are on an average much cooler, airier and pleasanter to work in than English factories.

The regulations applying particularly to the employment of women and children are as follows —

Children under 12 years of age may not be employed. Women under 21 and boys between 12 and 15 years old must not be employed unless they have obtained a medical certificate of fitness for employment in the factory and a certificate from the education authority that they have completed the elementary school course. The sanitary authority must make periodical enquiries to ascertain that the boys under 15 and women under 21 remain fit for their employment, and a special medical examination of any such person may be ordered at any time by a factory inspector¹.

Night work is forbidden for boys under the age of 15 and for all women. There are special provisions regulating the case of double shifts. Women must not be employed within a month after confinement.

Mothers must be allowed facilities for feeding their babies, and in factories where 50 women or upwards are employed, a nursery must be provided. In such cases at least half an hour must be allowed the mothers in addition to the ordinary meal times. Where the women

¹ It is very generally complained that much remains to be desired as regards the application of these portions of the law. In England, also, the provision for the medical inspection of children and young persons is observed very laxly.

have to go home to feed their babies the minimum time allowed must be an hour in addition to meal times. Drinking-water must always be provided.

Children under 15 years of age may not be employed for more than 11 hours a day, and adult women not for more than 12 hours.

Boys under 15 and women under 21 may not be employed to clean motors, mill gearing or machinery in motion. They may not be employed in cardrooms unless adequate provision is made for removing the dust.

Living accommodation provided for the operatives is subject to the examination of the factory inspectors in the same way as are the factory premises themselves.

There are sundry other provisions of the law, notably those relating to meal times, and requiring a copy of the law and notices regarding various prescribed matters to be displayed in the factory, which bear a fairly close resemblance to the provisions of the English Act. Particulars of rates of wages need not be displayed in Italian cotton factories.

An examination of the foregoing provisions will show that while the general plan of the Italian law for the protection of women and children is similar to the English, there are considerable differences in many of the details. The provision of nurseries in which mothers may attend to their infants, and the permission allowed them to go home for this purpose when no nursery is provided, are something quite new in factory legislation¹ and a notable advance on the English Act. But in other ways the English law is superior, particularly as regards the protection of young persons and children.

The hours of work allowed by law are much longer in Italy than in England, but actual practice in the Italian cotton industry is in advance of the law. The maximum

¹ Some French cotton millowners provide crèches for the children of their workpeople, especially in the Vosges district, but this is quite voluntary.

time worked in any cotton factory is 11 hours a day, and in most of the principal manufacturing districts agreements have been arrived at between the employers and the workpeople by which the hours of work are limited in some parts to 10 hours and in others to $10\frac{1}{2}$ hours a day, and in most cases factories close an hour earlier on Saturdays than on other week-days. The 11 hours' day is still common in country districts. Many spinning mills have adopted the system of double shifts, each set working eight hours, and this system is also in vogue in some weaving sheds where plain grey cloth is manufactured, especially in those using Northrop looms. In fancy weaving sheds, however, the single shift of 10 or $10\frac{1}{2}$ hours is the rule, as it is found that a greater proportion of faulty work is turned out in the hours from 8 to 11 p.m. than in any other similar period of time. This objection does not seem to apply to spinning or to the manufacture of plain cloth, or at least not to the same extent. An objection, however, that does hold good, is that in many places it is difficult to find sufficient operatives for two shifts¹. Where there is no scarcity of labour, employers have sometimes offered their workpeople the alternative of single sets of 11 hours a day, or double sets of 8 hours, and in such cases the double set is almost always preferred. There is, however, by no means unanimity amongst spinners as to the advisability of working double shifts, even where it is quite practicable to do so. The prohibition of the employment of adult women at night (i.e., where double shifts are worked, between 11 p.m. and 5 a.m.) did not come into force till 1907, and up to that year it was usual to work two shifts in spinning mills, a day shift of 11 hours and a night shift of 10 hours. Therefore, by working double shifts, the production of the mill

¹ In such cases a manufacturer who desired to obtain a greater volume of production would have to build a new factory in another neighbourhood if he could not attract people from other parts to his existing factory.

was almost doubled¹. But since 1907 the choice has usually been between one shift of 10 or 11 hours and two shifts totalling only 16 hours, so that double shifts mean nothing approaching double production². Hence, many spinners have preferred to reduplicate their plant and work single shifts, as by this means they are enabled to obtain a much greater total production than by the system of double shifts, while the lessened wear and tear of the machinery is some compensation for the greater capital expenditure involved in the new buildings and plant. Nevertheless, double shifts are still frequently worked in many both of the old and the new mills, and the rapid mill building of the last few years, while in some measure designed to compensate for the partial discontinuance of night work, has greatly increased the productive power of the country.

It is difficult to say what has been the effect of the curtailment of the hours of labour that has been brought about partly by law and partly by collective bargaining. Some manufacturers say that there has been an actual gain both in the quantity and quality of their product. Others, on the contrary, complain that the quantity has declined with no compensating improvement in the quality. No doubt the effect of the reduction of hours has differed much according to the various kinds of work done in the factories concerned. It is certain that on the whole the productivity of Italian factories has increased enormously since the beginning of the present century, but one cannot say definitely what effect, if any, the factory legislation and reduced hours of labour have had on the technical advance. What is certain, however, is that they have added much to the welfare and contentment of the workpeople, and whether

1 In some mills two long shifts are worked in the departments where only men are employed, i.e. in mixing, opening and carding, and only one long shift (10-11 hours) in other departments.

2 Capital charges, however, are reduced.

because of or in spite of these changes, the industry has continued to progress

Some consideration may now be devoted to the Law on Workmen's Accidents

The law deals both with the prevention of accidents and with the compensation to be paid to the sufferers, when accidents do occur. As regards the former part, it is laid down that every care must be taken to protect the life and person of the employes, and the executive is empowered to impose Special Rules applicable to factories in general, and also, in the case of specially risky occupations, to particular classes or sections of factories. Where the factory inspector finds that the means provided for safeguarding the workpeople are not the most efficient possible, the adoption of more perfect methods must be enforced. Although the form of the law differs from that of the English Factory Act in the greater wideness of its terms and in the extent to which powers are delegated to the executive, the general result is not very different than in England.

The greater part of the Italian statute is devoted to the question of compensation for accidents, the system being that of compulsory insurance against death or accident by the employer of all the workpeople employed in his factory. Any employer who by deductions from wages or otherwise directly or indirectly makes the operatives contribute to the premiums is liable to a heavy fine.

The amount of compensation to be paid in case of accident is as follows —

In case of permanent absolute incapacity, six times the annual wages of the injured person, and in no case less than £120, in case of permanent partial incapacity, six times the amount by which the injured person's annual earning power is lessened, and in no case less than £20. The compensation must as a rule be paid in the form of a pension for life, but under special

circumstances the court may, on the request of the injured person, order the capital sum to be paid. In case of temporary absolute incapacity a daily sum, equal to half the daily wages the injured person was getting at the time of the accident, must be paid during the continuance of the incapacity and commencing from the date of the accident, provided that the duration of the incapacity exceeds five days. A smaller daily sum must be paid during temporary partial incapacity.

In case of death five times the annual wages of the deceased must be paid to his dependents or representatives.

In addition, the employer is himself obliged in every case to undertake the expense of immediate medical assistance, or to have adequate provision for the rendering of first aid on the premises. The employer must in all cases pay an injured workman the full day's wages for the day on which the accident occurred.

In 1899 the National Fund for Insurance against Workmen's Accidents was formed on its present basis by the State in collaboration with some of the leading Savings Banks and ordinary banks. Employers may insure their workpeople either with the National Fund or with private companies authorised by the State.¹

Contracting-out is allowed if a scheme is instituted that offers the workpeople terms at least as advantageous as those offered under the Act.

Notice must be given within three days to the authorities and the insuring body of any accident causing death or considerable injury, and in case of death or of grave injury a public enquiry must be held.

An operative who sustains an injury, however trivial, must give prompt notice of it to the employer.

The fact that an employer has insured his workpeople does not absolve him in case of accident from civil

¹ There are at present eight such

liability to the person injured, if the accident was due to his failure to observe the preventive provisions of the statute, or to some negligence or default for which he would be liable to a penalty under the general law. However, in such a case the employer must only pay the injured person the amount by which the damages in which he is cast exceed the compensation due from the insuring body. The last-named must pay the compensation in the first instance to the injured person and he then has a right of action for recovery of the amount from the defaulting employer. Similarly, if it is proved that an accident was due to the workman's own wilful default, the insuring body can recover from him any amount paid by way of compensation.

In every factory a notice with particulars as to the insurance of the workpeople must be displayed.

CHAPTER XXI

TRADE ORGANISATIONS

SECTION I —*Trade Unions*

During the last few years trade unionism has developed into a strong force in the Italian cotton industry. As in all branches of social activity, local variety and independence mark Italian trade unionism. As a rule there is a union of the textile operatives in each district where the industry is carried on. Sometimes the bulk of the operatives belong to the union, but sometimes only a small proportion of them, and the subscriptions and funds are always very small. In most centres of any importance there is a "chamber of labour" which resembles somewhat the English trade councils, but much more closely the French Bourses du Travail. All the trade unions in the district are usually affiliated to the chamber of labour, which is the representative and guardian of general working-class interests. The unions as such, are non-political, and their efforts are generally confined to obtaining shorter hours and higher wages. But the aims of the chambers of labour are much wider in two directions, they are usually centres of socialist political propaganda, and many of them undertake activities whose object is the economic betterment of their members in various directions. Among such activities may be mentioned the provision of employment bureaux and of unemployed and sickness benefit. Strike pay also is an important item in their expenditure. Other work done by the chambers is the provision of free medical and legal advice for members, many chambers possess libraries, and some institute lectures

on economic and technical subjects¹ Several of the larger chambers receive subsidies from the municipalities, and others are permitted to use the municipal buildings for their meetings

If the members of a union affiliated to a chamber of labour are engaged in an industrial dispute the latter takes the matter up and either supports the workpeople in their struggle or endeavours to promote a reconciliation While in many districts the relations between employers and the chamber of labour are very strained, in others the most amicable terms prevail, and there are not a few employers who would rather deal with the chamber of labour than with their workpeople direct

Parallel with this local organisation there exists a national organisation according to trades, and as a rule a trade union is affiliated both to the chamber of labour of its district and to the trade federation, but the chambers of labour have a larger membership and greater influence than the national federations These are fighting bodies, whose object is to co-ordinate the efforts of the local unions to obtain better conditions, and they have not funds to undertake the friendly benefit and educational work performed by the chambers of labour

The local unions of the textile trade, to the number of about fifty, are united in the National Federation of Weavers and Dyers, which publishes a trade newspaper called *Le Arti Tessili* (The Textile Crafts) The seat of the Federation is at Milan, and there are regional committees in the other principal centres

In 1906 the General Confederation of Labour was formed jointly by the chambers of labour and the national federations of trade unions, in order to co-

¹ In several of the cotton manufacturing towns lectures are given or classes held in the evenings on textile subjects for the benefit of the operatives These classes are under the auspices either of the municipality itself or of the chamber of labour Equipment for practical work is as a rule of the scantiest but designs of machinery and sometimes lantern illustrations are available

ordinate the efforts made for the general advancement of the economic condition of the working-classes. It is the intention of the General Confederation to work from time to time on matters of mutual interest in conjunction with the National League of Co-operative Societies and the Federation of Friendly Societies. Nominally the General Confederation of Labour is non-political, but as a matter of fact it is directed largely by socialists, and its sympathies are strongly socialistic. But its organisation is quite distinct from that of the Socialist Party, and an attempt at co-operation between the two bodies in 1907 seems actually to have led to a breach between them.

The organisation sketched above has for the most part grown up since 1898, though chambers of labour existed before that date. Being so young, the trade unions do not fill such a large part in working-class life in Italy as in England, but their influence has grown rapidly, and though their organisation is much looser than that of the great unified English trade unions, they were able to act with complete solidarity and the greatest effect during the strikes that convulsed the cotton industry four or five years ago. Although a comparatively small proportion of the workpeople were organised, practically the whole body followed the union leaders with absolute loyalty, with the result that most valuable concessions were obtained in respect of both increased wages and reduced hours of work. This success gave a great impetus to the movement, which has progressed in the subsequent years of peace in both numbers and cohesion, though still far behind the English and German standard in both respects.

SECTION II — *Employers' Associations*

Most of the important firms engaged in the cotton industry belong to the Cotton Association (*Associazione fra gli Industriali Cotonieri*), whose headquarters are in

Milan The objects of the Association are to promote the welfare of the industry in all ways in which it may be advanced by united action, and its character is similar to that of the Swiss Spinners', Doublers' and Manufacturers' Association, and in some ways to the English Master Cotton Spinners' Federation. The adoption of concerted action in case of labour disputes does not form part of the Cotton Association's activities, and the employers in the Italian cotton industry possess no organisation for this purpose. An attempt was made to form a Union of Cotton Trade Employers (Unione Cotonieri) in connection with the Cotton Association for the purpose of presenting a united front to the trade unions, but the attempt was completely unsuccessful. The failure was chiefly due to the fear felt by many employers of offending their workpeople by a step that might appear provocative.

But although no combination of the employers in the cotton trade proved possible, "industrial leagues" have been formed on a local basis in many manufacturing centres, with the object of taking concerted action in labour disputes, membership being open to any employer of labour in the district. Leagues of this nature exist in Turin, Biella and Monza, but not in any other important cotton centre. These leagues are divided into sections comprising the members of the several industries represented in the league, but no section can take action apart from the league as a whole. The declared objects of the leagues are not merely to defend the interests of their members when a dispute occurs, but to promote friendly relations with the workpeople. Thus in Biella the industrial league and the chamber of labour have jointly agreed on a 10½ hours day to be observed in all textile factories.

It is interesting to observe that the employers, in so far as they have combined at all against the workpeople, have done so on a local and not on a trade basis, just as

the organisation of the workpeople in chambers of labour has proved more popular and effective than that in national federations of trade unions. It is a fact eloquent of the power of the cotton operatives, that apart from the exceptions noticed above, the employers have not ventured to form any combination to resist them, in spite of the advantage they possess in the fewness of their numbers and their superior education. Any combination of employers for negotiating agreements with the trade unions is occasional and temporary, in contrast with the increasing magnitude and stability of the workpeople's organisations.

APPENDED NOTE

EXTENT OF THE INDUSTRY IN OTHER EUROPEAN
COUNTRIES

THE following table, abstracted from the "Comtelburo" Handbook,¹ published in September, 1909, shows approximately the number (in thousands) of the spindles, looms, and operatives employed in the principal cotton manufacturing countries of Europe, other than Italy and Switzerland —

Country	Spindles ²	Looms	Operatives
Great Britain	57,026	739	620
Germany	10,163	230	375
{ Russia	6,700	155	350
{ Poland	1,249	12 ³	35 ³
France	6,731	110	95
{ Austria	4,412	144	127
{ Hungary	250	5	8
Spain	1,800	55	70
Belgium	1,200	24	15
Holland	465	30	26

1 Quoted from the "Manchester Guardian" January 3 1910

2 These figures are in many cases different from, and generally in excess of, the estimated numbers of spinning spindles in March 1909 as given in the Report of the Sixth International Congress of Cotton Spinners' and Manufacturers Associations. Possibly doubling spindles are included in some cases

3 Incomplete

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